Rossi Mine Expansion Project

Draft Environmental Impact Statement
2018

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Bureau of Land Management

Tuscarora Field Office

3900 Idaho Street

Elko, Nevada 89801

APPENDICES

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ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX A

PROJECT CONSISTENCY WITH GREATER SAGE-GROUSE APPROVED RESOURCE MANAGEMENT PLAN AMENDMENT (GRSG AMENDMENT)

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A.1 Introduction

In response to the USFWS 2010 "warranted, but precluded" ESA listing petition, the BLM initiated a review of conservation measures and policy within existing Resource Management Plans for field offices and districts that contain greater sage-grouse (GRSG) habitat. This review process was recently completed with the preparation of an Approved Resource Management Plan Amendment (ARMPA) and associated Environmental Impact Statement (EIS) to identify and incorporate conservation measures intended to conserve, enhance, and restore GRSG habitat (BLM 2015a). The 2015 ARMPA is more commonly referred to as the GRSG Amendment (GRSG Amendment). The GRSG Amendment provides guidance on measures to avoid and minimize potential impacts resulting from proposed projects in addition to providing appropriate measures to compensate for impacts that are unavoidable to GRSG habitat resulting from development projects that access existing and valid rights. A summary of the Rossi Mine Proposed Action and other action alternatives is provided in Chapter 1, Section 1.5.1, Land Use Conformance.

The following sections provide information on the consistency of the Rossi Mine Proposed Action and other action alternatives with the requirements of the September 2015 GRSG Amendment. As discussed in Section 2.5, the BLM has identified the Reconfiguration Alternative as the Preferred Alternative. The Preferred Alternative is consistent with the Elko Resource Management Plan, Issue – Minerals Management, Prescription No. 1 (BLM 1987a). **Table A-1** presents the five GRSG Amendment Minerals Resources Management Decisions (MRMD) applicable to locatable minerals projects and supporting information. **Table A-2** presents the four GRSG Amendment Management Decisions (MD) applicable to locatable minerals projects. **Table A-3** presents 22 GRSG Amendment general Required Design Features (RDF) applicable to all discretionary projects located within GRSG habitat in Nevada. **Table A-4** presents the seven GRSG Amendment RDFs specifically applicable to locatable mineral projects within GRSG habitat in Nevada.

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Table A-1. **Minerals Resources Management Decisions**

MRMD #	MRMD Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
15	Review **Objective SSS 4**, and to the extent allowed by law, apply **MDs SSS 1 through SSS 4** when reviewing and analyzing projects and activities proposed in GRSG habitat. (SSS 1 through SSS 4 are addressed below in **Table A-2.**)	Yes	Yes	Yes	Yes	**Objective SSS 4:** In PHMAs and GHMAs, apply the concept of "avoid, minimize, and compensatory mitigation" for all human disturbance in areas not already excluded or closed, so as to avoid adverse effects on GRSG and its habitat. The first priority would be to avoid new disturbance; where this is not feasible, the second priority would be to minimize and mitigate any new disturbance (GRSG Amendment, Appendices F and I). The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation (UUD) of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. In addition to measures to avoid and minimize adverse impacts, HES could implement voluntary compensatory mitigation for residual impacts through the Nevada Conservation Credit System or through off-site habitat enhancement on selected parcels of GRSG habitat that have been degraded by wildfire and other anthropogenic disturbances. The BLM coordinated with the Nevada Sagebrush Ecosystem Technical Team (SETT) and Halliburton Energy Services (HES) to calculate the amount of compensatory mitigation to offset residual impacts using the State of Nevada's Conservation Credit System (CCS). The final number of credits purchased would be determined based on proximity to the project. See Section A.6, Compensatory Mitigation, below, for further detail. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment. Under the Preferred Alternative, impacts to GRSG and habitat have been analyzed to ensure prevention of unnecessary or undue degradation of public lands.
16	Recommend for withdrawal SFA under the General Mining Act of 1872, as amended, subject to valid existing rights (see BLM 2015a, Appendix A; Figures 2-1 and 2-4).	No	-	-	-	No Sagebrush Focal Areas (SFAs) are located within the project area.
17	On public lands, manage disturbances associated with notice-level activity in GRSG habitat on a landscape basis to avoid segmenting a project. Do this by encouraging operators and claimants to consolidate exploration into a plan of operations to reduce the proliferation of mining notices, in accordance with 43 CFR, Part 3809.21(b).	Yes	Yes	Yes	Yes	HES has included surface exploration into the plan of operations amendment. Draft EIS Section 2.3.10 states: HES would continue to conduct temporary surface disturbance for exploration activities within the proposed PoO boundary. Exploration activities would include construction of roads and drilling pads, surface sampling, trenching, bulk sampling, geotechnical investigation, geophysical survey, water well installation, and drilling using both reverse circulation and core drill rigs. Under the Proposed Action, an additional 67 acres of surface disturbance would result from exploration activities.
18	Subject to valid existing rights and applicable law, authorize locatable mineral development activity, by approving plans of operation and apply mitigation and best management practices that minimize the loss of PHMAs and GHMAs or that enhance GRSG habitat by applying the "avoid, minimize and compensatory mitigation" process through an applicable mitigation system, such as the Nevada Conservation Credit System.	Yes	Yes	Yes	Yes	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. Under all Rossi Mine action alternatives, including the Preferred Alternative, impacts to GRSG and habitat have been analyzed to ensure prevention of unnecessary or undue degradation of public lands. See Section A.7, Potential Mitigation and Monitoring, below for further detail. In addition to measures to avoid and minimize adverse impacts, HES is considering implementing voluntary compensatory mitigation for residual impacts through the Nevada Conservation Credit System or through off-site habitat enhancement on selected parcels of GRSG habitat that have been degraded by wildfire and other anthropogenic disturbances. The BLM coordinated with the Nevada SETT and HES to calculate the amount of compensatory mitigation to offset residual impacts using

Table A-1. Minerals Resources Management Decisions

MRMD #	MRMD Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
						the State of Nevada's Conservation CCS. The final number of credits purchased would be determined based on proximity to the project. See Section A.6, Compensatory Mitigation, below for further detail. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment.
19	Close or mitigate abandoned mine sites in PHMAs and GHMAs to reduce GRSG predation by eliminating physical structures that could provide nesting opportunities and perching sites for predators.	No	-	-	-	NA

[1] Preferred Alternative.

Table A-2. Management Decision(s) SSS 1 through SSS 4

MD #	MD Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
SSS 1	In PHMAs and GHMAs, work with the proponent/applicant, whether in accordance with a valid existing right or not, and use the following screening criteria to avoid effects of the proposed human activity on GRSG habitat: A. First priority—locate project/activity outside PHMAs and GHMAs B. Second priority—if the project/activity cannot be placed outside PHMAs and GHMAs, locate the surface-disturbing activities in non-habitat areas first, then in the least suitable habitat for GRSG C. Third priority—collocate the project/activity next to or in the footprint of existing infrastructure	No	Yes	Yes	Yes	Ore bodies are in place and not flexible in terms of location. HES has consolidated its proposed facilities at the mine site and around ore bodies to increase feasibility and lower material handling costs. HES's Rossi Mine site location for associated mining facilities is limited to their claim block for locatable mining claims. HES has worked with the BLM to avoid effects of human activity on GRSG and habitat. Evidence of the effort to avoid and minimize impacts is demonstrated in the reduction of acreage of impacts under the Preferred Alternative in comparison to the Proposed Action. Impact acreages of PHMA and GHMA under the Preferred Alternative have been reduced by approximately 13%, in comparison to the Proposed Action. HES has further reduced potential impacts by withdrawing and reducing the extent of some previously authorized facilities in addition to implementing concurrent reclamation in areas where no further activity is approved or planned. Reclamation of surface disturbance within the PoO boundary is required while off-site mitigation is a voluntary action for locatable minerals projects under the 43 CFR 3809 Regulations. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands.
SSS 2 (PHMA)	**In PHMAs, the following conditions will be met in order to avoid, minimize, and mitigate any effects on GRSG and its habitat from the project/activity:**					
SSS 2A (PHMA)	Manage discrete anthropogenic disturbances, whether temporary or permanent, so they cover less than 3 percent of 1) biologically significant units (BSUs; total PHMA area associated with a GRSG population area (see Appendix A; **Figure 2-2**) and 2) in a proposed project analysis area. See Appendix E, Disturbance Cap Guidance, for additional information on implementing the disturbance cap, including what is and is not considered disturbance and how to calculate the proposed project analysis area, as follows: 1. If the 3 percent human disturbance cap is exceeded on all lands (regardless of ownership) in PHMAs in any given BSU, then no further discrete human disturbances (subject to applicable laws and regulations, such as the 1872 Mining Law, as amended, and valid existing rights) will be permitted, by BLM within GRSG PHMA in any given BSU until the disturbance has been reduced to less than the cap (see Nevada exception under MD SSS 2 a. 3. Appendix E). 2. If the 3 percent disturbance cap is exceeded on all lands (regardless of land ownership) within a proposed project analysis area in a PHMA, then no further anthropogenic disturbance will be permitted by BLM until disturbance in the proposed project analysis area has been reduced to maintain the area under the cap (subject to applicable laws and regulations, such as the 1872 Mining Law, as amended, valid existing rights; see Nevada exception under MD SSS 2 a. 3. Appendix E).	No[3]	-	-	Yes	GRSG Amendment Appendix E directs that the disturbance cap analysis should be conducted and results provided in NEPA analyses, but any exceedances of the cap (at both the BSU and project levels scales) do not preclude a locatable mineral resources project with existing valid rights from BLM approval. The BSU disturbance is calculated once a year at the BLM National Operations Center. The affected BSU for this project is the Owyhee BSU. In 2016, approximately 0.54% of PHMA within the Owyhee BSU was disturbed by cumulative actions. BLM Nevada State Office has conducted project scale calculations for the Proposed Action and action alternatives. Results of the project scale disturbance calculations for the Preferred Alternative yields a 5.09 percent disturbance. See Section A.2 of this appendix.
SSS 2B (PHMA)	In PHMA, in undertaking BLM management actions, and consistent with valid existing rights and applicable law, in authorizing third-party actions that result in habitat loss and degradation, the BLM will require and ensure mitigation that provides a net conservation gain to the species, including accounting for any uncertainty associated with the effectiveness of such mitigation. The project/activity with associated mitigation (such as the use of the State of Nevada Conservation Credit System) will result in an overall net conservation gain to GRSG (see Appendix F).	No	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment. In addition to measures to avoid and minimize adverse impacts, HES is considering implementing voluntary compensatory mitigation for residual impacts either through the Nevada Conservation Credit System or through off-site habitat enhancement on selected parcels of GRSG habitat that have been degraded by wildfire and other anthropogenic disturbances. The BLM coordinated with the Nevada SETT and HES to calculate the compensatory mitigation to offset residual impacts using the State of Nevada's CCS. The final number of credits purchased would be determined based on proximity to the project. See Section A.6, Compensatory Mitigation, below for further detail regarding both alternatives.

Table A-2. Management Decision(s) SSS 1 through SSS 4

MD #	MD Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
SSS 2C (PHMA)	Authorized/permitted activities are implemented by adhering to the RDFs described in Appendix C, consistent with applicable law. At the site-specific scale, if an RDF is not implemented, at least one of the following must be demonstrated in the NEPA analysis associated with the project/activity: 1. A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g., due to the site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. 2. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. 3. A specific RDF will provide no additional protection to GRSG or its habitat.	Yes	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment. Under the Preferred Alternative, the Rossi Mine would be consistent with a majority of RDFs presented in **Table A-3** and **Table A-4**, below, due to the project designs.
SSS 2D (PHMA)	In management actions, and consistent with valid and existing rights and applicable law in authorizing third-party actions, the BLM will apply the lek buffer-distances identified in the U.S. Geological Survey (USGS) report, Conservation Buffer Distance Estimates for GRSG —A Review Open File-Report 2014-1239 (Manier et al. 2014), in accordance with Appendix B.	No	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. All of the active leks within four miles of the project area are located to the north of the existing and proposed mine facilities. Locations of these leks are generally in the lower elevations of the Squaw Creek and Alkali Creek drainages where the topography is flat and open. Between the lek locations and the existing and proposed mining facilities are multiple unnamed ridges and small land forms that screen each lek location from mining activity. Due to this existing topography between active leks and mining activity it is likely that impacts from noise and light generated during operational periods is significantly reduced. The Rossi Mine has been in operation for 70 years, since 1947. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment.
SSS 2E (PHMA)	Seasonal restrictions will be applied during the period specified below to manage discretionary surface-disturbing activities and uses on public lands to prevent disturbances to GRSG during seasonal life-cycle periods: 1. In breeding habitat within 4 miles of active and pending GRSG leks from March 1 through June 30 a. Lek—March 1 to May 15 b. Lek hourly restrictions—6 p.m. to 9 a.m. c. Nesting—April 1 to June 30 2. Brood-rearing habitat from May 15 to September 15 a. Early—May 15 to June 15 b. Late—June 15 to September 15 3. Winter habitat from November 1 to February 28 The seasonal dates may be modified due to documented local variations (e.g., higher/lower elevations) or annual climatic fluctuations (e.g., early/late spring, long/heavy winter), in coordination with NDOW, in order to better protect GRSG and its habitat.	No	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. All of the active leks within four miles of the project area are located to the north of the existing and proposed mine facilities. Locations of these leks are generally in the lower elevations of the Squaw Creek and Alkali Creek drainages where the topography is flat and open. Between the lek locations and the existing and proposed mining facilities are multiple unnamed ridges and small land forms that screen each lek location from mining activity. Due to this existing topography between active leks and mining activity it is likely that impacts from noise and light generated during operational periods is significantiy reduced. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment.
SSS 2F (PHMA)	Authorizations and permits will limit noise from discretionary activities (during construction, operation, and maintenance) to not exceed 10 decibels above ambient sound levels at least	No	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. Results of project related noise emission modeling indicate a low

Table A-2. Management Decision(s) SSS 1 through SSS 4

MD #	MD Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
	0.25 mile from active and pending leks, from 2 hours before to 2 hours after sunrise and sunset during the breeding season. See Appendix M, GRSG Noise Protocol.					probability for noise level exceedances of greater than 10 dBA at active GRSG leks within four miles of the PoO boundary (See Appendix I). In addition, to ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment. In addition to measures to avoid and minimize adverse impacts, HES is considering implementing voluntary compensatory mitigation for residual impacts either through the Nevada Conservation Credit System or through off-site habitat enhancement on selected parcels of GRSG habitat that have been degraded by wildfire and other anthropogenic disturbances. The BLM coordinated with the Nevada SETT and HES to calculate the compensatory mitigation to offset residual impacts using the State of Nevada's CCS. The final number of credits purchased would be determined based on proximity to the project. See Section A.6, Compensatory Mitigation, below for further detail regarding both alternatives.
SSS 3 (GHMA)	**In GHMAs, the following conditions will be met in order to avoid, minimize, and mitigate any effects on GRSG or its habitat from the project/activity:**					
SSS 3A (GHMA)	In GHMAs, in undertaking BLM management actions, and consistent with valid existing rights and applicable law, in authorizing third-party actions that result in habitat loss and degradation, the BLM will require and ensure mitigation that provides a net conservation gain to the species, including accounting for any uncertainty associated with the effectiveness of such mitigation. The project/activity with associated mitigation (such as the use of the State of Nevada Conservation Credit System) in GHMAs will result in an overall net conservation gain to GRSG (see Appendix F, Regional Mitigation Strategy).	Yes	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment. In addition to measures to avoid and minimize adverse impacts, HES is considering implementing voluntary compensatory mitigation for residual impacts either through the Nevada Conservation Credit System or through off-site habitat enhancement on selected parcels of GRSG habitat that have been degraded by wildfire and other anthropogenic disturbances. The BLM coordinated with the Nevada SETT and HES to calculate the compensatory mitigation to offset residual impacts using the State of Nevada's CCS. The final number of credits purchased would be determined based on proximity to the project. See Section A.6, Compensatory Mitigation, below for further detail regarding both alternatives.
SSS 3B (GHMA)	Authorized/permitted activities are implemented adhering to the RDFs described in Appendix C, consistent with applicable law. At the site-specific scale, if an RDF is not implemented, at least one of the following must be demonstrated in the NEPA analysis associated with the project/activity: 1. A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g., due to the site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. 2. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. 3. A specific RDF will provide no additional protection to GRSG or its habitat.	Yes	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment. Under the Preferred Alternative, the Rossi Mine would be consistent with a majority of RDFs as presented in **Table A-3** and **Table A-4,** below, due to the project designs.
SSS 3C (GHMA)	In undertaking BLM management actions, and consistent with valid and existing rights and applicable law in authorizing third-party actions, the BLM will apply the lek buffer-distances identified in the USGS report, Conservation Buffer Distance Estimates for Greater Sage-Grouse—A Review Open File Report 2014-1239 (Manier et.al 2014]), in accordance with Appendix B.	No	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other

Table A-2. Management Decision(s) SSS 1 through SSS 4

MD #	MD Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
						action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. All of the active leks within four miles of the project area are located to the north of the existing and proposed mine facilities. Locations of these leks are generally in the lower elevations of the Squaw Creek and Alkali Creek drainages where the topography is flat and open. Between the lek locations and the existing and proposed mining facilities are multiple unnamed ridges and small land forms that screen each lek location from mining activity. Due to this existing topography between active leks and mining activity it is likely that impacts from noise and light generated during operational periods is substantially reduced. The Rossi Mine has been in operation for 70 years, since 1947. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment.
SSS 3D (GHMA)	Seasonal restrictions will be applied during the period specified below to manage discretionary surface-disturbing activities and uses on public lands to prevent disturbing GRSG during seasonal life cycle periods, as follows: 1. In breeding habitat within 4 miles of active and pending GRSG leks from March 1 through June 30 a. Lek—March 1 to May 15 b. Lek hourly restrictions—6 p.m. to 9 a.m. c. Nesting—April 1 to June 30 2. Brood-rearing habitat from May 15 to September 15 a. Early—May 15 to June 15 b. Late—June 15 to September 15 3. Winter habitat from November 1 to February 28 The seasonal dates may be modified due to documented local variations (e.g., higher/lower elevations) or annual climatic fluctuations (e.g., early/late spring, long/heavy winter), in coordination with NDOW, in order to better protect GRSG and its habitat.	No	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. All of the active leks within four miles of the project area are located to the north of the existing and proposed mine facilities. Locations of these leks are generally in the lower elevations of the Squaw Creek and Alkali Creek drainages where the topography is flat and open. Between the lek locations and the existing and proposed mining facilities are multiple unnamed ridges and small land forms that screen each lek location from mining activity. Due to this existing topography between active leks and mining activity it is likely that impacts from noise and light generated during operational periods is significantly reduced. The Rossi Mine has been in operation for 70 years, since 1947. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment.
SSS 3E (GHMA)	Authorizations and permits will limit noise from discretionary activities (during construction, operation, and maintenance) to not exceed 10 decibels[2] above ambient sound levels at least 0.25 mile from active and pending leks, from 2 hours before to 2 hours after sunrise and sunset during the breeding season. See Appendix M, GRSG Noise Protocol.	No	-	-	-	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. Results of project related noise emission modeling indicate a low probability for noise level exceedances of greater than 10 dBA at active GRSG leks within four miles of the PoO boundary (see Appendix I). In addition, to ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. All of the active leks within four miles of the project area are located to the north of the existing and proposed mine facilities. Locations of these leks are generally in the lower elevations of the Squaw Creek and Alkali Creek drainages where the topography is flat and open. Between the lek locations and the existing and proposed mining facilities are multiple unnamed ridges and small land forms that screen each lek location from mining activity. Due to this existing topography between active leks and mining activity it is likely that impacts from noise and light generated during operational periods is substantially reduced.

Table A-2. Management Decision(s) SSS 1 through SSS 4

MD #	MD Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative[1]*	*Livestock Fencing Alternative*	
						The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment.
SSS 4 (OHMA)	In OHMAs, authorized/permitted activities are implemented adhering to the RDFs described in Appendix C, consistent with applicable law. At the site-specific scale, if an RDF is not implemented, at least one of the following must be demonstrated in the NEPA analysis associated with the project/activity: 1. A specific RDF is documented to not be applicable to the site-specific conditions of the project/activity (e.g., due to the site limitations or engineering considerations). Economic considerations, such as increased costs, do not necessarily require that an RDF be varied or rendered inapplicable. 2. An alternative RDF is determined to provide equal or better protection for GRSG or its habitat. 3. A specific RDF will provide no additional protection to GRSG or its habitat.	No	-	-	-	No OHMA occurs within the project area. Under the Preferred Alternative, the Preferred Alternative would be consistent with a majority of RDFs as presented in **Table A-3** and **Table A-4,** below, due to the project designs.

[1] Preferred Alternative.
[2] Decibels on the A-weighted scale.
[3] MD SSS 2A is not applicable to non-discretionary permit approvals with regards to the limitation of surface disturbance to 3% of PHMA within the BSU and project scales, although the results of the disturbance calculations are disclosed in NEPA analyses.

Table A-3. General Required Design Features (RDF)

RDF #	RDF Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
1	Locate new roads outside of GRSG habitat to the extent practical.	No	Yes	Yes	Yes	New roads are minimized to the extent practical while still allowing access to valid claims/ore bodies. HES has to work on their locatable mining claims, which are located within the proposed plan of operations boundary.
2	Avoid constructing roads within riparian areas and ephemeral drainages. Construct low water crossings at right angles to ephemeral drainages at stream crossings (note that such construction may require permitting under Sections 401 and 404 of the Clean Water Act).	Yes	Yes	Yes	Yes	Proposed access roads do not impact riparian areas but do cross ephemeral drainages. HES Water Quality Applicant Committed Environmental Protection Measures (**Table 2-16**) include: • Roads would be designed to the minimum standards needed to accommodate the intended safe use and to maintain surface resource protection; • Road construction would be conducted in such a manner as to minimize cuts and fills, including limiting road construction on steep slopes, where possible; • Access across drainages, seeps, and springs would be avoided where possible; • Drainage structures would be constructed or installed where necessary to prevent or minimize erosion and sedimentation; • Drainage structures may consist of, but not be limited to, water bars, borrow ditches, contour furrows, and culverts sized to handle maximum seasonal water flows; • Exploration activities would be kept to a minimum distance of 100 feet from drainages that are actively flowing.
3	Limit construction of new roads where roads are already in existence and could be used or upgraded to meet the needs of the project or operation. Design roads to an appropriate standard, no higher than necessary, to accommodate intended purpose and level of use.	Yes	Yes	Yes	Yes	New roads within the PoO boundary are limited to haul roads designed to MSHA standards. The new access roads segments will utilize cut and fill and will be constructed as necessary to provide safe travel conditions. HES Water Quality Applicant Committed Environmental Protection Measures (**Table 2-16**) include: • Roads would be designed to the minimum standards needed to accommodate the intended safe use and to maintain surface resource protection; • Road construction would be conducted in such a manner as to minimize cuts and fills, including limiting road construction on steep slopes, where possible.
4	Coordinate road construction and use with right of way (ROW) holders to minimize disturbance to the extent possible.	Yes	Yes	Yes	Yes	No new road ROWs are proposed for public access other than the minor re-routes around proposed mine facilities. Approximately 2,879 feet of the Antelope-Boulder Connector Road would be re-routed around the west end of the proposed King Pit Expansion as shown in **Figure 2-3** of the Rossi EIS. In addition, approximately 2,890 feet of the Boulder Valley Road would be re-routed around the east end of the proposed QLC Pit and approximately 1,950 feet of the Boulder Valley Road would be re-routed around the east end of the proposed expanded King Pit as shown in **Figure 2-3**. HES would coordinate with Elko County for this and other existing ROWs within the project area. Other new roads within the PoO boundary are limited to haul access and exploration roads associated with mining and exploration activities.
5	During project construction and operation, establish and post speed limits in GRSG habitat to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.	Yes	Yes	Yes	Yes	MSHA compliant speed limits are currently in place and would be maintained within the PoO boundary.
6	Newly constructed project roads that access valid existing rights would not be managed as public access roads. Proponents will restrict access by employing traffic control devices such as signage, gates, and fencing.	No	Yes	Yes	Yes	New mine roads and exploration roads would be managed as non-public access routes and appropriate signage would be installed. Signage would not indicate a restriction of public access to public lands for other appropriate uses (e.g., recreation). The new access roads that are meant to provide public access and cross mining claims would be managed as access routes allowing public access.

Table A-3. General Required Design Features (RDF)

RDF #	RDF Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
7	Require dust abatement practices when authorizing use on roads.	Yes	Yes	Yes	Yes	HES, in compliance with the NDEP- Bureau of Air Pollution Control (BAPC) Surface Disturbance Permit which is part of Air Quality Operating Permit AP3295-2080, would undertake road maintenance activities to reduce fugitive dust emissions. HES Air Quality Applicant Committed Environmental Protection Measures (**Table 2-16**) relative to dust abatements practices include: • Roads within the Project area would be watered, graveled, or chemically treated to reduce fugitive dust emissions, as needed. • Vehicle speeds would be reduced in areas of disturbance to minimize the potential for fugitive dust emissions, to protect wildlife and livestock, and to maintain operational safety. • HES would use wet drilling methods to reduce the potential for fugitive dust emissions during blasthole drilling and exploration activities.
8	No RDF #8 Listed in the GRSG Amendment.					
9	Upon project completion, reclaim roads developed for project access on public lands unless, based on site-specific analysis, the route provides specific benefits for public access and does not contribute to resource conflicts.	Yes	Yes	Yes	Yes	All project related haul, secondary, and exploration roads would be reclaimed upon mine closure. Some would be concurrently reclaimed when no further use is needed. The access roads that are constructed for the purpose of providing public around the mine site would remain as public access routes upon the completion (closure and reclamation) of the mine site.
10	Design or site permanent structures that create movement (e.g., pump jack/ windmill) to minimize impacts on GRSG habitat.	No	Yes	Yes	Yes	No structures that result in automated repetitive movement are proposed.
11	Equip temporary and permanent aboveground facilities with structures or devices that discourage nesting and perching of raptors, corvids, and other predators.	Yes	TBD	TBD	TBD	The Rossi Mine Bird and Bat Conservation Strategy states: The Rossi Mine is served by a 120 kilovolt line that was completed in 2013 by NV Energy (Stantec 2014). The line has five structures including Structure 1, a 3-pole tap structure; Structure 2, a 3-pole switch; Structures 3 and 4, two 2-pole H-frame structures; and Structure 5, a 3-pole angle. Structures 2, 3, and 4 have horizontal cross arms that include perch-deterrent plates. Structures 1 through 4 also have plastic pole-top cones installed to prevent birds from perching on the pole tops. Other miscellaneous project facilities use perch deterrents on ledges, rooftops, and other areas providing potential perches. All new electrical distribution lines under the Proposed Action and action alternatives would be buried within the footprint of proposed disturbance and therefore would not create new perching areas.
12	Control the spread and effects of nonnative, invasive plant species (e.g., by washing vehicles and equipment, minimize unnecessary surface disturbance; Evangelista et al. 2011). All projects would be required to have a noxious weed management plan in place prior to construction and operations.	Yes	TBD	TBD	TBD	HES Vegetation Applicant Committed Environmental Protection Measures (**Table 2-16**) include: • HES would be responsible for controlling noxious weeds in the project area until the reclamation activities have been determined to be successful and released by the BLM and NDEP-BMRR. HES would follow the measures described in the Rossi Mine Reclamation Plan (SRK 2014a); • This plan provides management strategies and provisions for annual monitoring and treatment of noxious weeds; • The potential for invasive, non-native weeds becoming established would be reduced through the use of the approved certified weed-free seed mixture and the implementation of prompt and appropriate revegetation techniques; • The best management practices of actively treating invasive, non-native weeds upon discovery would also prevent these weed species from spreading; • All light vehicles and heavy equipment that have been off road (at another site) and exposed to possible noxious weed seeds would be washed before coming on to the Rossi Mine site. HES standards allow for light vehicles and heavy equipment to be washed on-site at the designated wash areas. HES's Noxious Weed Control measures are discussed in the Noxious and Invasive Weed Management Plan (HES 2016i) and Section 4.5.4, Monitoring Plan, of the PoO.

Table A-3. General Required Design Features (RDF)

RDF #	RDF Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
13	Implement project site-cleaning practices to preclude the accumulation of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of GRSG.	Yes	Yes	Yes	Yes	HES Solid Waste Applicant Committed Environmental Protection Measures (**Table 2-16**) include: • HES would keep an inventory of hazardous materials in accordance with federal, state, and local regulations; • Solid waste would be collected and transported off-site periodically for disposal at an approved solid waste facility. HES Bird and Bat Conservation Study (BBCS) Section 6.1, General Protection Measures, states: • Garbage would be removed at frequent intervals to avoid attracting scavengers and avian predators to the site. This would preclude the accumulative of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of GRSG.
14	Locate project related temporary housing sites outside of GRSG habitat.	No	Yes	Yes	Yes	No temporary housing is proposed under action alternatives.
15	When interim reclamation is required, irrigate site to establish seedlings more quickly if the site requires it.	No	-	-	-	HES's current interim reclamation practices have been successful within the Rossi Mine project area. No irrigation of interim sites is required.
16	Utilize mulching techniques to expedite reclamation and to protect soils if the site requires it.	Yes	-	-	-	HES's current interim reclamation practices have been successful within the Rossi Mine project area. Mulching treatments are included in the proposed PoO for use as an optional treatment in specific cases where mulching is determined to be beneficial to reclamation success.
17	Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.	Yes	No	No	No	The majority of disturbance under the Preferred Alternative would be reclaimed. Rossi Mine pits would not be backfilled with the exception of the Dawn Pit, Queen Lode Pit, and the eastern half of the Queen Lode Complex Pit. WRDFs would be reclaimed in place at 2.5 to 3:1 H:V, not returned to pre-disturbance landform. Large constructed topographic features, such as WRDFs, would have rounded crests and variable slope angles to resemble natural landforms, to the extent possible (**Table 2-16**). BLM recognizes that changes to certain landforms has been previously authorized and would result under the proposed action alternatives.
18	When authorizing ground-disturbing activities, require the use of vegetation and soil reclamation standards suitable for the site type prior to construction.	Yes	Yes	Yes	Yes	Rossi Mine EIS Chapter 2 states: HES would reclaim all areas within the PoO boundary disturbed by mining and processing and exploration activities in accordance with BLM and NDEP-BMRR regulations and the approved Rossi Mine Reclamation Plan (No. 0257). Reclamation activities are designed to meet the BLM regulations contained in 43 Code of Federal Regulations (CFR) 3809 and achieve post-mining land uses consistent with the Elko Resource Area Resource Management Plan.
19	Instruct all construction employees to avoid harassment and disturbance of wildlife, especially during the GRSG breeding (e.g., courtship and nesting) season. In addition, pets shall not be permitted on-site during construction.	Yes	Yes	Yes	Yes	HES SSS Wildlife Applicant Committed Environmental Protection Measures (**Table 2-16**) include: • Employees, contractors, and other related personnel would receive training regarding environmental responsibilities required by federal and state laws and the PoO. HES BBCS Section 7.5, Personnel Training, states: • In order to effectively implement the BBCS, Halliburton would ensure that all appropriate personnel undergo training on the issues and protocols outlined in the BBCS. This training ensures that all appropriate personnel have a thorough understanding of the BBCS and their responsibility to bird and bat protection and regulatory compliance. Pets are not allowed within the Rossi Mine operations area.
20	To reduce predator perching in GRSG habitat, limit the construction of vertical facilities and fences to the minimum number and amount needed and install anti-perch devices where applicable.	No	Yes	Yes	Yes	Existing 120 kV transmission line structures include perch deterrents. Construction of new vertical structures within GRSG habitat would be limited to the extent possible. All new electrical distribution lines under the Proposed Action and action alternatives would be buried within the footprint of proposed disturbance and therefore would not create new perching areas. New structures would include perch deterrents on a case by case basis in coordination with the BLM.

Table A-3. General Required Design Features (RDF)

RDF #	RDF Text	Applied (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
21	Outfit all reservoirs, pits, tanks, troughs or similar features with appropriate type and number of wildlife escape ramps.	No	TBD	TBD	TBD	HES BBCS Section 3.2, Proposed Facilities, states: • Exploration sumps may be located on or off the pad with a maximum size of 40 by 50 feet and would be constructed with one end sloped to provide egress for wildlife; Escape ramps for wildlife would be provided if troughs/pits/tanks are needed for mine construction and operation.
22	Load and unload all equipment on existing roads to minimize disturbance to vegetation and soil.	Yes	Yes	Yes	Yes	HES Vegetation Applicant Committed Environmental Protection Measures include: • Removal and disturbance of vegetation would be kept to a minimum through construction site management.

[1] Preferred Alternative.

Table A-4. Locatable RDFs

RDF #	RDF Text	Applicable (Yes/No)	GRSG Amendment Consistency (Yes/No)			Notes
			Proposed Action	*Reconfiguration Alternative*[1]	*Livestock Fencing Alternative*	
1	Install noise shields to comply with noise restrictions (see Action SSS 7) when drilling during the breeding, nesting, brood-rearing, and/or wintering season. Apply GRSG seasonal timing restrictions when noise restrictions cannot be met.	No	Yes	Yes	Yes	The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. Results of project related noise emission modeling indicate a low probability for noise level exceedances of greater than 10 dBA at active GRSG leks within four miles of the PoO boundary (See Appendix I).
2	Cluster disturbances associated with operations and facilities as close as possible, unless site-specific conditions indicate that disturbances to GRSG habitat would be reduced if operations and facilities locations would best fit a unique special arrangement.	Yes	Yes	Yes	Yes	HES's facilities are clustered for economic and technical feasibility by limiting the distance haul trucks must move ore, waste rock material and tailings. Exploration activity would be conducted on HES' mining claims.
3	Restrict pit and impoundment construction to reduce or eliminate augmenting threats from West Nile virus.	No	Yes	Yes	Yes	No new impoundments for holding water are proposed under the Preferred Alternative.
4	Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues, use the following steps for reservoir design to limit favorable mosquito habitat: • Overbuild size of ponds for muddy and non-vegetated shorelines • Build steep shorelines to decrease vegetation and increase wave actions • Avoid flooding terrestrial vegetation in flat terrain or low lying areas • Construct dams or impoundments that restrict down slope seepage or overflow • Line the channel where discharge water flows into the pond with crushed rock • Construct spillway with steep sides and line it with crushed rock • Treat waters with larvicides to reduce mosquito production where water occurs on the surface	No	Yes	Yes	Yes	See RDF #3 above.
5	Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.	Yes	Yes	Yes	Yes	Rossi Mine EIS Chapter 2 states: • HES would reclaim all areas within the PoO boundary disturbed by mining and processing and exploration activities in accordance with BLM and NDEP-BMRR regulations and the approved Rossi Mine Reclamation Plan (No. 0257). Reclamation activities are designed to meet the BLM regulations contained in 43 Code of Federal Regulations (CFR) 3809 and achieve post-mining land uses consistent with the Elko Resource Area Resource Management Plan.
6	Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling, and revegetating cut and fill slopes.	Yes	Yes	Yes	Yes	Haul and exploration roads, along with other roads associated with the mining operation would be reclaimed. The access roads are public roads and would not be reclaimed in order to provide continued access for recreation and public use. Two of the access roads involved in this project are designated as BLM roads on the BLM travel management plan.
7	Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce sage-grouse mortality.	No	Yes	Yes	Yes	The open pits are too large to cover with netting. Netting would be impossible to maintain and could become a hazard for people, wildlife, and birds. This RDF is intended for process ponds that include cyanide or other toxic chemicals. No process ponds or other impoundments that would include toxic chemicals or substances are proposed under the Proposed Action or Preferred Alternative. The sage-grouse leks are located four miles to the north of the project.

A.2 Disturbance Calculations

Under Management Decision SSS 2A of the GRSG Amendment (**Table A-2,** above), the BLM is required to conduct analysis of the area of disturbance at the local or project scale, in addition to analysis of disturbance densities across the BSU according to the methodology presented in GRSG Amendment Appendix E. The disturbance cap analysis results are provided in NEPA analyses, but any exceedances of the cap (at both the BSU and project levels scales) do not preclude a locatable mineral resources project with existing valid rights from BLM approval.

A.2.1 Project Scale Calculation of the Preferred Alternative

Project scale disturbance calculations were conducted by the BLM for the Preferred Alternative according to the methods presented in Appendix E of the GRSG Amendment. PHMA habitat is the only habitat category considered in the calculation. The study area for the density calculation is comprised of a four mile buffer of the disturbance footprint for the proposed project and an additional four mile buffer of all occupied GRSG leks located within the initial disturbance footprint buffer. PHMA within the project scale study area for the calculation totaled 36,257 acres. The 3% disturbance cap for the Rossi Mine project study is approximately 1,088 acres of PHMA. Existing disturbance within the density calculation study area totaled 1,132 acres, representing approximately 3.12% of the density disturbance calculation study area. Existing disturbance acreages included approximately 200 acres of roads, 721 acres of mining related disturbance, 7 acres for communication towers and other vertical structures, 56 acres of other developed ROWs, and 148 acres of power lines. The area of PHMA anticipated to be disturbed or removed under the Preferred Alternative would be 739 acres (2014 Habitat Management Categories). The combination of existing disturbance (1,132 acres) and new proposed disturbance (739 acres) totals approximately 1,871 acres, representing 5.16% of the density calculation study area. Therefore, under the Preferred Alternative, the Rossi Mine project would not be consistent with the 3% disturbance cap.

A.2.2 Biological Significant Unit Scale Calculation of the Preferred Alternative

The BSU disturbance is calculated once a year at the BLM National Operations Center. The affected BSU for this project is the Owyhee BSU. In 2016, approximately 0.54% of PHMA within the Owyhee BSU was disturbed by cumulative actions.

A.3 Seasonal Habitats

As discussed in **Table A-2,** above, the proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation to public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. The analysis and potential mitigation for GRSG outlined in Sections A.6, Compensatory Mitigation, and A.7, Potential Mitigation and Monitoring, of this Draft EIS are consistent with the GRSG Amendment.

A.4 Required Lek Buffers

Under the GRSG Amendment, the BLM is directed to apply the lower end of lek buffer distances identified in the USGS Report on Conservation Buffer Distance Estimates for Greater Sage-Grouse – A

Review (USGS 2014) to discretionary project approvals. Appendix B of the GRSG Amendment provides the following recommend lek buffers be applied to discretionary actions:

- Surface disturbance (activities that alter or remove the natural vegetation) within 3.1 miles of leks;
- Tall structures (e.g., communication towers, transmission towers and lines) within 2 miles of leks;
- Low structures (e.g., fences, rangeland structures) within 1.2 miles of leks; and
- Noise and related disruptive activities including those that do not result in habitat loss (e.g., motorized recreational events) at least 0.25 mile from leks.

The proposed project is a non-discretionary action authorized under the General Mining Law of 1872. Under the General Mining Law of 1872 and the 43 CFR 3809 regulations, the BLM may regulate such operations in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment (**Figure A-1**). **Figure A-2**, presents recommend lek buffers as applied to the Preferred Alternative, as directed in Appendix B of the GRSG Amendment. All of the active leks within four miles of the project area are located to the north of the existing and proposed mine facilities. Locations of these leks are generally in the lower elevations of the Squaw Creek and Alkali Creek drainages where the topography is flat and open. Between the lek locations and the existing and proposed mining facilities are multiple unnamed ridges and small land forms that screen each lek location from mining activity. Due to this existing topography between active leks and mining activity it is likely that impacts from noise and light generated during operational periods are significantly reduced.

Rossi Mine Expansion Project EIS

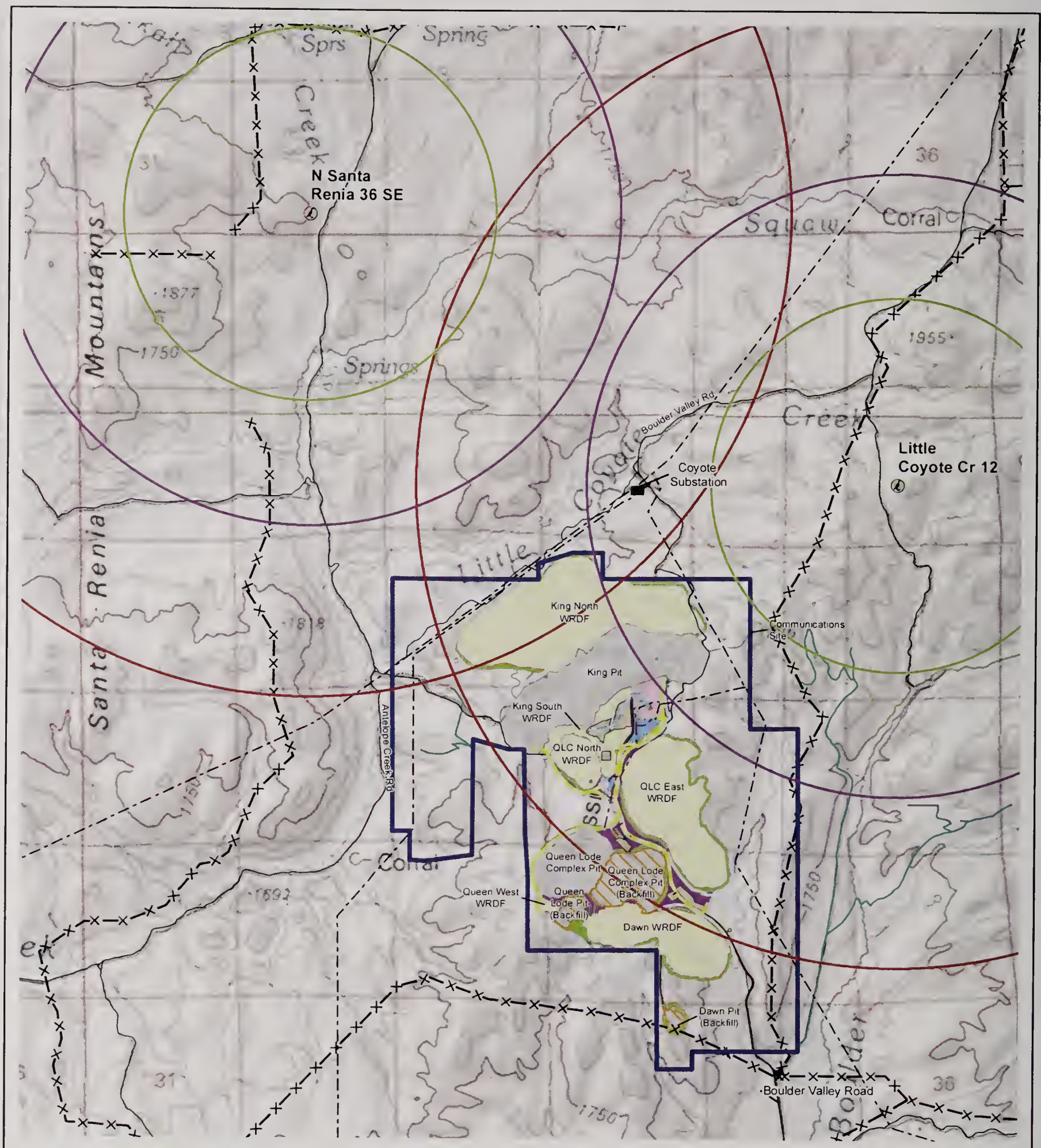
Figure A-1

Greater Sage-grouse Seasonal Habitat within the Study Area

0 1 2 Miles
0 1 2 Kilometers
1:100,000

N

11/10/2017



Rossi Mine Expansion Project EIS

Figure A-2

Recommended Greater Sage-grouse Lek Buffer Distances and Reconfiguration Alternative Facilities

11/10/2017

A.5 Habitat Objectives

As directed by the GRSG Amendment, all BLM use authorizations would contain terms and conditions regarding the actions needed to meet or progress toward meeting the habitat objectives. BLM habitat objectives from Table 2-2 of the GRSG Amendment are presented in **Table A-5,** below. The BLM in coordination with NDOW has identified four separate long-term habitat monitoring plot locations within the vicinity of the Rossi Mine project. BLM monitoring of these parcels follows the Land Health Assessment (LHA) protocols described by Herrick *et al.* (2015) to assess multiple cover indicators including vegetation cover, composition, and height, the proportion of bare ground, inter-canopy gaps, and soil stability. In addition, the LHA program uses Interpreting Indicators of Rangeland Health (IIRH) methodology presented in Pellant *et al.* (2005) to qualitatively evaluate site and soil stability, hydrologic function, and biotic community integrity. The monitoring plot locations have been stratified by seasonal habitat type. Baseline GRSG habitat conditions were assessed in the field in 2016 and then would be repeated periodically over the life of the Rossi Mine project and reclamation period. Results of the LHA baseline assessment are presented in Appendix I of this EIS. This baseline data would become part of the BLM's landscape-level land health assessments for the area. The project is an activity that would result in habitat loss/degradation. These residual habitat impacts could be mitigated through HES's voluntary utilization of the Nevada Conservation Credit System or through off-site habitat enhancement (see Section A.6).

Table A-5. GRSG Habitat Objectives

Attribute	Indicators	Desired Condition (Habitat Objectives)
GENERAL/LANDSCAPE-LEVEL[1]		
All life stages	Rangeland health assessments	Meeting all standards[2]
Cover (nesting)	Seasonal habitat needed	>65% of the landscape in sagebrush cover
	Annual grasses	<%5
Security (nesting)	Conifer encroachment	<3% phase I (>0 to <25% cover) No phase II (25 to 50% cover) No phase III (>50% cover)
Cover and food (winter)	Conifer encroachment	<5% phase I (>0 to <25% cover) No phase II (25 to 50% cover) No phase III (>50%)
	Sagebrush extent	>85% sagebrush land cover
LEK (Seasonal Use Period: March 1 to May 15)[1]		
Cover	Availability of sagebrush cover	Has adjacent sagebrush cover
Security[3]	Pinyon or juniper cover	<3% landscape cover within 0.6 mile of leks
	Proximity of tall structures[4]	Use Manier et al. 2014- Conservation Buffer Distance Estimates for GRSG-A Review; preference is 3 miles

Table A-5. GRSG Habitat Objectives

Attribute	Indicators	Desired Condition (Habitat Objectives)
NESTING (Seasonal Use Period: April 1 to June 30)[1]		
Cover	Sagebrush cover	>20%
	Residual and live perennial grass cover (such as native bunchgrasses)	>10% if shrub cover is <25%[5]
	Annual grass cover	<5%
	Total shrub cover	>30%
	Perennial grass height (includes residual grasses)	Provide overhead and lateral concealment from predators
Security[2]	Proximity of tall structures[4] (3 feet [1 meter] above shrub)	Use Manier et al. 2014, Conservation Buffer Distance Estimates for GRSG-A Review; preference is 3 miles
BROOD-REARING/SUMMER (Seasonal Use Period: May 15 to September 15; Early: May 15 to June 15; Late: June 15 to September 15)[1]		
UPLAND HABITATS		
Cover	Sagebrush cover	10 to 25%
	Perennial grass cover and forbs	>15% combined perennial grass and forb cover
	Deep rooted perennial bunchgrass (within 522 feet [200 meters] of riparian areas and wet meadows)	7 inches[6, 7]
Cover and food	Perennial forb cover	>5% arid >15% mesic
RIPARIAN/MEADOW HABITATS		
Cover and food	Riparian areas/meadows	PFC
Security	Upland and riparian perennial forb availability and understory species richness	Preferred forbs are common with several species present[6] High species richness (all plants)
	Riparian area/meadow interspersion with adjacent sagebrush	Has adjacent sagebrush cover
WINTER (Seasonal Use Period: November 1 to February 28)[1]		
Cover and Food	Sagebrush cover	>10% above snow depth
	Sagebrush height	>9.8 inches above snow depth

[1] Any one single habitat indicator does not define whether the habitat objective is or is not met. Instead, the preponderance of evidence from all indicators within that seasonal habitat period must be considered when assessing GRSG habitat objectives.
[2] Upland standards are based on indicators for cover, including litter, live vegetation, and rock, appropriate to the ecological potential of the site.
[3] Applicable to Phase I and Phase II pinyon and/or juniper.
[4] Does not include fences.
[5] In addition, if upland rangeland health standards are being met.
[6] Relative to ecological site potential.
[7] In drought years, 4-inch perennial bunchgrass height with greater than 20 percent measurements exceeding 5 inches in dry years.

A.5.1 On-site Minimization of Impacts

On-site minimization of disturbance at the Rossi Mine site would consist of both concurrent reclamation and the final reclamation at the site. See Section 2.3.12, Closure and Reclamation Plan, for the proposed reclamation of the mine site. Concurrent reclamation would consist of reclaiming each lift of the WRDFs as the lift is completed working from the bottom to the top of the facility or partially or totally reclaiming a facility that is no longer active or in use. Each lift would be regraded, receive growth medium placement, and would be seeded. Reclamation seed mixes would be developed from the reclamation plant list in Chapter 2.0, Section 2.3.12, Closure and Reclamation Plan. All mine facility components would be reclaimed including the backfilled open pits. The only mine facility components that would not be reclaimed are the open pit areas that are not backfilled; therefore, the unreclaimed open pits would be the residual impacts that remain for the mine site. The unreclaimed open pits would include a total of 194 acres under the Proposed Action and 144 acres under the Reconfiguration Alternative.

A.6 Compensatory Mitigation

The proposed project is a mining operation authorized under the General Mining Law of 1872. The BLM may regulate such operations under 43 CFR 3809 in order to prevent unnecessary or undue degradation of public lands. To ensure the prevention of unnecessary or undue degradation of public lands, the proponent has designed the proposed action to prevent UUD and has proposed a robust suite of Applicant Committed Environmental Protection Measures in the Proposed Action and other action alternatives, including implementation of applicable design features and management decisions from the 2015 Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment. Compensatory mitigation for wildlife is a voluntary action under the CFR 3809 regulations and BLM IM 2018-93. Potential voluntary compensatory mitigation has been included in the document and analyzed. The BLM, HES, and NDOW have discussed the potential voluntary compensatory mitigation presented in this document. This EIS presents two distinct options for implementing voluntary compensatory mitigation to offset residual impact to GRSG habitat under the selected alternative. These options include purchasing credits under the State of Nevada's CCS or providing for off-site habitat enhancement on selected parcels of GRSG habitat that have been degraded by wildfire and other anthropogenic disturbances. Discussion of the voluntary compensatory mitigation options is presented in the following subsections.

A.6.1 Nevada Conservation Credit System

The State of Nevada CCS program is being analyzed as potential voluntary mitigation per the Memorandum of Understanding (MOU) between the BLM and Nevada Department of Conservation and Natural Resources (NDCNR). HES may utilize the CCS to offset impacts of proposed project surface disturbance (GRSG Amendment, Mitigation MD MIT1). The final number of credits purchased would be determined based on the location of the lands for which credits are developed for the CCS and the proximity of these lands to the Rossi Mine project. Results of a preliminary desktop analysis using the CCS Habitat Quantification Tool (HQT) (SETT 2017) for the Preferred Alternative indicate that the HES credit obligation range of 437 to 503 would be required to fully offset the anticipated temporary impacts during the life of the Rossi Mine as presented in **Table A-6**. The credit obligation range for credits is not the result of uncertainty in the results of the CCS HQT analysis of the Preferred Alternative, but rather from the application of a Proximity Ratio that incentivizes the credit purchaser HES to obtain credits to offset Rossi Mine impacts from projects located within the local Tuscarora GRSG Population Management Unit (PMU).

In comparison to the Preferred Alternative, the debits required to be compensated for under the Proposed Action would range from 433 to 498. The difference in debit ranges between the Preferred Alternative and the Proposed Action can be attributed to the difference in disturbance acreage for the proposed QLC North WRDF and QLC East WRDF and the proximity of these facilities to breeding habitat located to the north of the PoO boundary (**Figure 2-4** and **Figure 2-7**).

There are 5,643 compensatory mitigation credits currently available for purchase on the open market, and the CCS continues to develop credit producing projects in coordination with private land holders in Nevada and anticipates having additional credits available on the open market in the near future. The CCS is a market based system where the cost of purchasing mitigation credits is unknown until the time of credit purchase and details of the final transaction would remain confidential between the credit purchaser and seller. The CCS does maintain administrative records of credit development and sales. The CCS provides information upon finalization of a transaction to ensure that the number of credits purchased fully offsets the number of debits resulting from a proposed action.

Effectiveness: Utilizing the CCS to purchase credits based on functional acres lost or potential mitigation measures discussed in Section A.7 may result in a net conservation gain for the species. Due to the fact that specific locations of credits potentially purchased to offset the removal of GRSG habitat under the Rossi Mine Expansion project have not been identified, the potential exists for the effects of compensatory mitigation to benefit GRSG populations occurring elsewhere in Nevada and not specifically within the Rossi Mine area.

Table A-6. Range of Temporary Conservation Credit Obligations for the Preferred Alternative

Area of Credit Purchase	Base Credit Obligation	Proximity Ratio Multiplier	Adjusted Credit Obligation[2]
Within Tuscarora PMU	437	1.0	437
Within Owyhee BSU	437	1.05	459
Within WAFWA[1] Zone III	437	1.1	481
Outside WAFWA Zone III	437	1.15	503

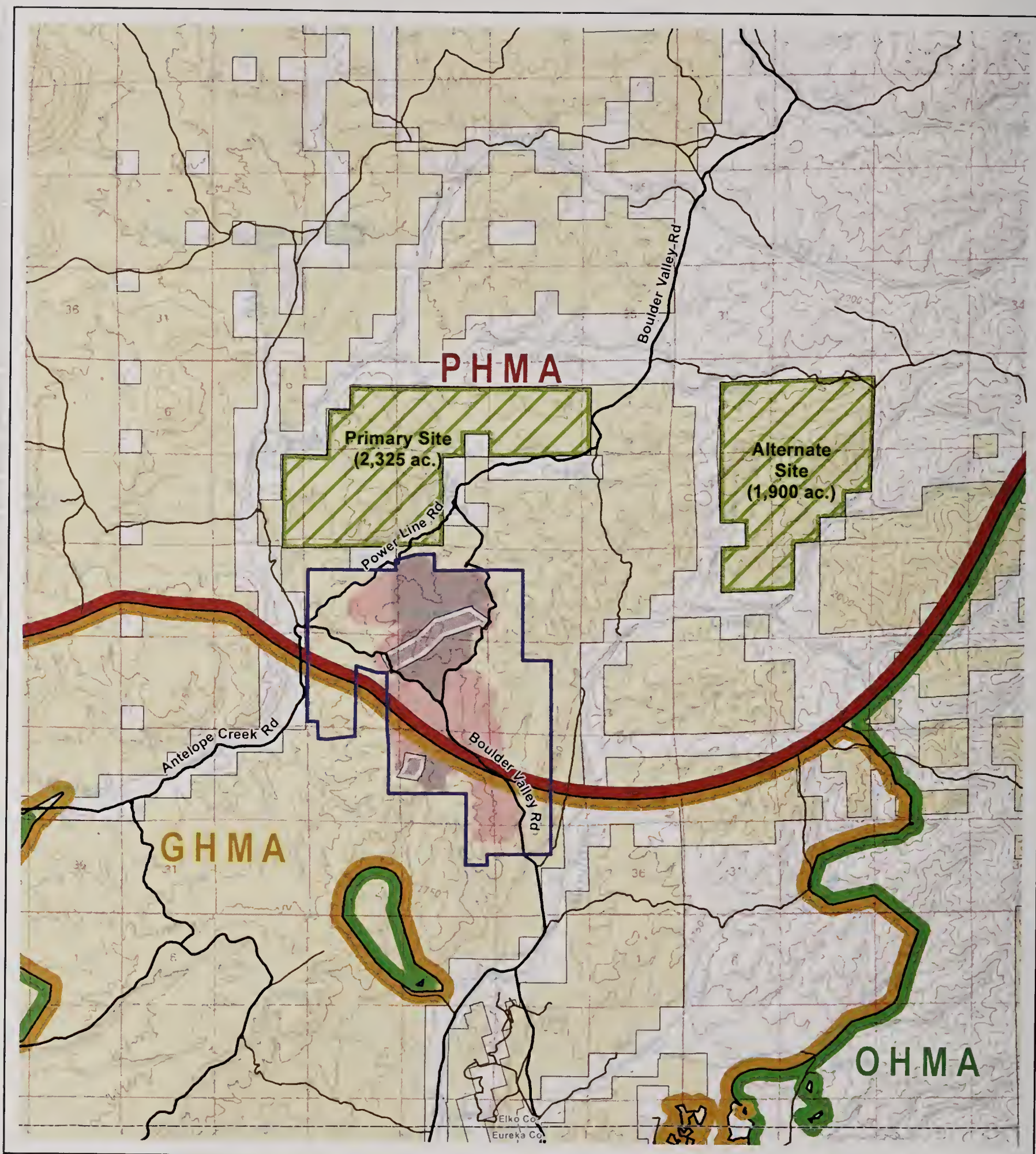
[1] Western Association of Fish and Wildlife Agencies.
[2] Rounded to the nearest whole number.

A.6.2 Off-site Habitat Enhancement of Greater Sage-Grouse Habitat

The second voluntary compensatory mitigation option under consideration to offset residual impacts to GRSG habitat under the selected alternative consists of conducting habitat enhancement efforts in the area of the Rossi Mine. Under this option, HES could perform habitat enhancements on selected parcels of GRSG habitat that have been degraded by recent wildfire and other anthropogenic disturbances. Habitat enhancements would be conducted in coordination with BLM and NDOW and could include mechanical soil treatments, browse species seeding, herbicide treatment, prescribed burn treatments, development of fire breaks, rest from livestock grazing, cultural resource inventory or other habitat enhancements beneficial to the Tuscarora GRSG PMU population as presented under mitigation measure SSS-3 in Section A7, Potential GRSG Mitigation and Monitoring. This voluntary mitigation option would work towards restoring areas of GRSG habitat within the Carlin Trend to a level of habitat suitability that promotes increased sustainability of the local GRSG population and potentially allowing for the population to expand into areas that are currently considered to be of marginal suitability for the species. Treatments of GRSG habitat would be implemented with the overall goal of successfully promoting GRSG habitat conditions identified in **Table A-5,** above. The BLM recognizes that not all areas can be restored to conditions identified in **Table A-5** due to various factors including soil types, precipitation regimes, local site hydrology, and the effects of current and past land uses. The BLM, in coordination with HES and NDOW, believes that the voluntary off-site mitigation considered for implementation on the parcels presented in **Figure A-3** represent the best opportunity to improve GRSG habitat conditions for the local GRSG population that would be impacted under an approval of either action alternative analyzed in this EIS.

Off-site Compensatory Mitigation Sites

The BLM, HES, and NDOW have coordinated to identify two parcels of BLM managed public land located near the existing Rossi Mine for the voluntary implementation of habitat enhancements outlined in this plan for both mule deer and greater sage-grouse (**Figure A-3**). A field tour of the proposed mitigation sites by representatives from HES, BLM, NDOW, and the 26 Ranch was conducted on October 12, 2016. Participants toured the primary and alternate mitigation sites and reviewed each site's existing conditions and potential for restoration through habitat enhancement. All of the field tour participants were in agreement that implementation of habitat enhancements at these sites to offset impacts from the Rossi Mine Expansion Project represent an opportunity to provide important habitat for the local GRSG population. The BLM and NDOW also have confidence that all other wildlife species potentially impacted by the Rossi Mine Expansion Project would benefit from the voluntary implementation of habitat enhancements at these sites.



Primary Mitigation Site

The primary mitigation site is located approximately 0.25 miles to the north of the proposed Rossi Mine Expansion PoO boundary and includes 2,325 acres (**Figure A-3**). This entire site is designated as GRSG PHMA. This site was burned by wildfire in 2005. Effects of the wildfire included removing a significant portion of the existing sagebrush (*Artemisia* spp.) and other native vegetation cover components which resulted in invasion of non-native invasive plants and noxious weed species. Non-native invasive species and noxious weeds currently present within the site include cheatgrass (*Bromus tectorum*) and Medusahead (*Taeniatherum caput-medusae*). BLM and NDOW biologists have identified this site as having the appropriate topography, soil types, proximity to large tracts of undisturbed GRSG habitat to the north, and proximity to water sources (springs and seeps) that would provide high quality habitat for GRSG if habitat enhancement treatments were implemented successfully. This site would also provide suitable habitat for other wildlife species in the area and important migration range for local resident mule deer moving from summer range to the east and winter range to the west of the site.

Alternate Mitigation Site

A second alternate mitigation site has also been identified as a potential area for habitat enhancements in the event that further analysis of the primary mitigation site identifies other sensitive resources that could be adversely impacted by wildlife habitat enhancement activities (e.g., unidentified cultural resources or sites). This alternate mitigation site is located approximately two miles to the northeast of the proposed Rossi Mine Expansion Project PoO boundary and includes approximately 1,900 acres (**Figure A-3**). Similar to the primary mitigation site, the entire alternate site is designated as GRSG PHMA. This site was burned by wildfire in 2011. Effects of the wildfire included removing a significant portion of the existing sagebrush and other native vegetation cover components which resulted in invasion of noxious weeds and non-native invasive plant species such as cheatgrass and Medusahead. BLM and NDOW biologists have identified this site as having the appropriate topography, soil types, proximity to large tracts of undisturbed greater sage-grouse habitat to the northeast, and proximity to water sources (springs and seeps) that would provide high quality habitat for GRSG if habitat enhancement treatments were implemented successfully. This site would also provide suitable habitat for other wildlife species in the area and important migration range for local resident mule deer moving from summer range to the east and winter range to the west of the site.

A.7 Potential Greater Sage-Grouse Mitigation and Monitoring

Issue: The temporary direct impacts from construction and operation of the Rossi Mine Expansion Project to PHMA and GHMA and the permanent removal of PHMA and GHMA resulting from the expansion of the King Pit and western portion of the QLC Pit would result in the reduction of available habitat for GRSG.

Mitigation Measure SSS-3: HES could volunteer to mitigate at a 3:1 ratio for acres of PHMA and a ratio of 2:1 for acres of GHMA temporarily removed as a result of construction and operation of the Rossi Mine Expansion Project in addition to the acreage of permanent habitat loss resulting from the expansion of the King Pit and western portion of the QLC Pit that would not be backfilled or reclaimed.

Implementation of voluntary compensatory mitigation could include habitat enhancements at the primary or alternate off-site habitat enhancement area identified in coordination with the BLM and NDOW (**Figure A-3**). Another optional area to conduct habitat restoration may be on PHMA and GHMA habitat that burned in the 2017 Rooster Comb fire, including supplementing the BLM's fire rehabilitation efforts in the burn area. Habitat enhancements could include, but are not limited to, mechanical soil treatments, browse species seeding, herbicide treatment, prescribed burn treatments, development of fire breaks, fencing to provide rest from livestock grazing, or other habitat enhancements beneficial to the Tuscarora greater sage-grouse PMU population. This mitigation measure may include fencing the treatment area for a minimum of three growing seasons. Acreage of surface disturbance under the Livestock Fencing Alternative would not be mitigated under Measure SSS-3.

The types of habitat enhancement efforts that would be considered for funding and implementation under SSS-3 include but are not limited to:

- **Seeding Treatments** – Possible seeding treatments include broadcast and drag, drill, broadcast/aerial, harrow, disking and hand.
- **Mechanical Treatment** – To provide for an adequate seedbed, mechanical treatments would include disking (plowing), harrowing and mowing existing grasses.
- **Livestock Grazing and Protective Fencing** – Rest from livestock grazing.
- **Herbicide Treatment** – A combination of Imazapic and Glyphosate herbicide treatments would be used to suppress nonnative annuals and crested wheatgrass in order to introduce shrubs, forbs and grasses into the treatment areas.
- **Prescribed Burn Treatments** – Controlled burns would be used to reduce fuels, control competing vegetation, and improve wildlife habitat.
- **Cultural Resource Inventory** – Treatment areas located on public lands would require a cultural resource inventory prior to implementation of any ground disturbing habitat enhancement efforts. Cultural resource inventory needs would be determined by the BLM. The BLM would be required to complete Section 106 Consultation with SHPO, prior to any implementation of the voluntary compensatory mitigation measures on public lands.

Restoration activities would occur within an 8-year period and would commence within 1-2 years of the initiation of the project approval.

Effectiveness: Voluntary Implementation of off-site habitat restoration and enhancements on the parcels identified in **Figure A-3** at a ratio of 3:1 for acres of PHMA and 2:1 for acres of GHMA removed under the approved action alternative would result in an overall net conservation benefit to the local Tuscarora GRSG population as both PHMA and GHMA habitat would be restored. The BLM has determined that the mitigation ratios discussed above are necessary in order to ensure that off-site mitigation provides a net benefit to the species in addition to accounting for the uncertainty that all areas of treatment or enhancement would be successful. Various factors can influence the overall success of habitat enhancements that are beyond the control of HES and the BLM and can include, but are not limited to, shifts in climate, excessive or prolonged drought, and wildfire. Once restoration efforts are successful, GRSG habitat at these locations would provide increased suitability for GRSG through increased native forb abundancy and increased sagebrush canopy cover. These shifts in vegetation communities would result in greater sustainability of the local GRSG population over time through increased availability of native forage and nesting substrate. In addition, the implementation of habitat restoration and enhancement would likely result in a reduction of non-native and invasive plant species within the mitigation parcel through targeted mechanical, herbicide, or burn treatments. These reductions in non-native and invasive plant species would result in an increase in the resiliency of the parcel to withstand disturbance by wildfire and would increase the overall sustainability of available GRSG habitat within the vicinity of the Rossi Mine.

A.7.1 Analysis of Resource Effects Resulting from Habitat Enhancement

Voluntary implementation of mitigation measures described under SSS-3 for the treatment of land for GRSG habitat would affect the following elements or resources: air quality, cultural resources, noxious weeds and nonnative invasive plant species, range resources, soil, vegetation, visual resources, water resources, wildlife resources and special-status species. The proposed locations for mitigation are located within the analysis area for the proposed action and described in this EIS.

Air Quality

Ground disturbing activities would result in increased dust and suspended particulate matter. These impacts would be more severe if treatments occurred on dry soil during windy conditions. Vehicle use would contribute to air quality impacts, resulting in increased dust and emissions from vehicle exhaust. Application of pesticides would result in short-term impacts to air quality, but would be minimized through

proper use and adherence to pesticide labels. Treatments would be expected to decrease the likelihood of blowing soil and dust, and would improve overall air quality in the long term.

Cultural Resources

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended, the appropriate level of cultural resource inventory and Native American consultation would be conducted for the treatment areas. If historic properties are identified within these areas and cannot be avoided by restoration activities, mitigation measures would be developed and implemented through a Memorandum of Agreement (MOA) between the BLM and Nevada State Historic Preservation Office (SHPO). The MOA would outline treatment to mitigate unavoidable adverse effects to the historic properties and provide documentary evidence that the BLM has met the requirements of Section 106 of the NHPA, which would be complete unless unknown historic properties or human remains are discovered in the area.

Noxious Weeds and Nonnative Invasive Plant Species

Direct effects would include the short-term reduction of cheatgrass and medusahead through chemical and mechanical control. Any noxious weed or nonnative invasive plant species detected within the treatment window would also be treated. Overall, restoration treatments would include a reduction of cheatgrass, medusahead, and annual forbs with the long-term establishment of seeded shrubs, perennial grasses, and forbs. The establishment of perennial grasses, shrubs and forbs would benefit the understory, out-compete nonnative invasive annuals, and create a more fire adapted ecosystem that is resilient to disturbance and thereby improve the Fire Regime Condition Class.

Range Resources

Impacts to livestock grazing would occur both in the short and long-term. Short-term impacts would result from the temporary closure of treatment areas to livestock grazing. The closure may result in the temporary suspension of some AUMs. Once the treated area has met the desired monitoring criteria, the area would be re-opened to livestock grazing. In the event the proposed treatment does not establish to the desired objectives after 2 years, the treatment would be evaluated to determine if additional rest from livestock grazing is needed. Restoration treatments would reduce the potential for increased fire cycles, which could result in widespread fire closures to livestock throughout the allotments.

Soil

Impacts to soil would occur during the short-term as a result of mechanical surface disturbance. Restoration treatments would disturb soil from 1 to 6 inches in depth depending on the method used and existing soil conditions. Severity of impacts would depend on soil properties such as hazard of erosion by wind and water, T-Value (tolerable soil loss value), presence/absence of biological soil crusts, as well as, antecedent conditions such as existing soil quality and moisture. Treatments would indirectly improve soil quality in the long-term by establishing more extensive vegetation cover. Vigorous vegetation canopies and root systems would provide numerous benefits for soil quality by improving aggregate stability, compaction, infiltration, organic matter, soil biota and reducing erosion by wind and water.

Vegetation

Restoration treatments would eliminate the standing cheatgrass and medusahead vegetation and the underlying thatch as well as suppress or inhibit the growth of cheatgrass and medusahead by the use of chemical means. Herbicide treatments would consist of the use of Glyphosate in area where undesirable nonnative invasive annuals are dominate, and Imazapic in areas where some perennial vegetation exists. The treatments would help to restore many functions for the affected ecological sites and further reduce the risk of a permanent conversion to non-desirable species. The proposed treatments would reduce the potential for large wildfires by replacing the nonnative invasive annual species with perennial species which are more fire resistant.

Visual Resources

Visual resources would be affected by linear features created by some treatments (e.g., disking and seeding rows, fences, etc.); however, these effects would only create weak to moderate contrasts. Overall, restoration treatments would enhance the color, form and texture of visual resources in the area. The treatments would help to alleviate contrast by increasing the vegetative diversity of the area through the establishment of a mix of perennial vegetation. The establishment of perennial vegetation would change the texture from uniform and fine to more patchy and coarse. Both form and color would be more varied with the different vegetation types. Once perennial vegetation is established, the project area would more closely approximate the color, form and texture of the native vegetation that existed prior to the cheatgrass and medusahead monocultures. Moderate contrasts would occur with any adjacent areas of cheatgrass and medusahead monocultures.

Water Resources

Direct impacts would be limited to surface erosion during heavy rainfall or high intensity precipitation events. Any disturbance would be temporary and negated by re-establishment of vegetation. Although existing vegetation may be altered, a residue would remain and provide protection against rainfall or precipitation events.

Wildlife Resources

Directs impacts to wildlife resources would include the short-term reduction of poor quality habitat, displacement by wildlife from the treatment areas, and increased habitat fragmentation until vegetation is re-established. In some instances, less mobile wildlife species that use burrows could be crushed by equipment. Indirect impacts would include increased noise an additional human presence during restoration activities. The degree of the impacts on wildlife species would depend on factors such as the sensitivity of the species, seasonal use patterns, type and timing of project activity, and physical parameters (e.g., topography, cover, forage, and climate). The mitigation treatments would result in the re-establishment of shrub and perennial grass and forb cover for seasonal or transitional range use by wildlife. The proposed treatments also would protect intact habitat areas with a shrub component and mixed diversity of perennial grasses and forbs from wildland fires.

Special-Status Species

Potential impacts to special-status species would be the same as described above for wildlife resources.

A.7.2 Voluntary Implementation of Compensatory Mitigation/Habitat Enhancement

The BLM, NDOW, and HES have worked closely to develop the proposed approach to voluntary compensatory mitigation for impacts to wildlife and wildlife habitat potentially affected by the Rossi Mine Expansion Project. There are two potential approaches to the voluntary implementation of on the ground habitat enhancements at the primary or alternate mitigation sites identified in **Figure A-3**. If HES chooses to implement GRSG compensatory mitigation/habitat enhancement, the BLM would assist in the formation of a Rossi Mitigation Wildlife Working Group (WWG) comprised of representatives for HES, BLM, NDOW, the current grazing permittee and others. The WWG would review proposed mitigation parcels and proposed treatments prior to implementation, determine details of implementation, and convene post implementation to monitor the effectiveness of habitat treatments.

A.7.3 Monitoring of Compensatory Mitigation Effectiveness

Monitoring of Habitat Enhancement Treatments

The desired outcome of GRSG habitat enhancements is the production of a functioning and stable habitat for GRSG and other native wildlife species within the treatment parcel identified in **Figure A-3**. HES's decision to implement compensatory habitat enhancements and vegetation rehabilitation

treatments would be monitored using techniques outlined by the USGS in the Strategy for Monitoring Post-fire Rehabilitation Treatments Handbook. Treatment goals would be set by the BLM or WWG prior to treatment implementation and would include consideration of site conditions pre-treatment, treatment method and species planted. Invasive species management treatments (including chemical, manual and mechanical treatments) would be considered effective if greater than 80 percent of the targeted weed species are affected by the treatment during the year. Infestation size and density would be measured annually to determine progress and to adapt management plans for treatment areas.

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ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX B

VISUAL SIMULATIONS

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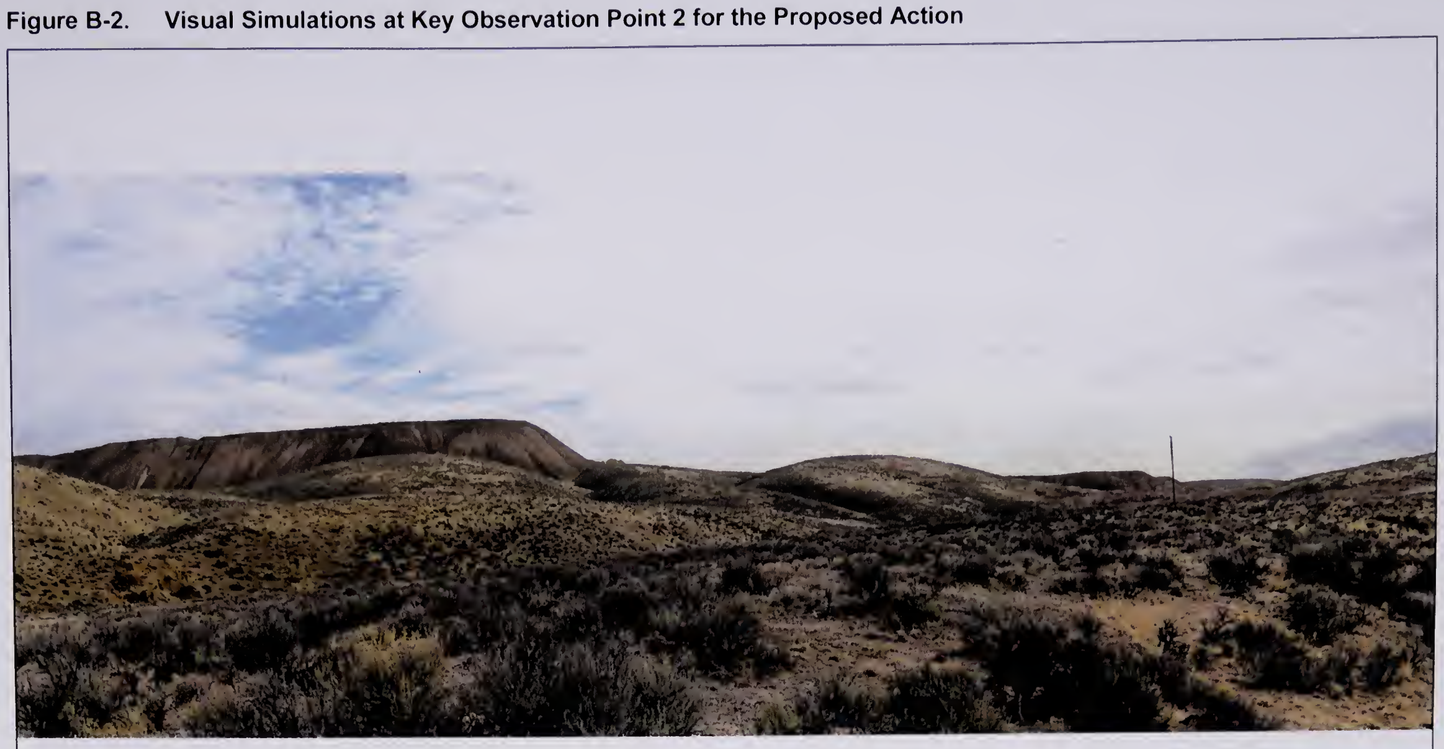
Figure B-1. Visual Simulations at Key Observation Point 1 for the Proposed Action

Existing Condition

Proposed Post-Mining Condition

Proposed Reclaimed Condition

Figure B-2. Visual Simulations at Key Observation Point 2 for the Proposed Action



Existing Condition

Proposed Post-Mining Condition

Proposed Reclaimed Condition

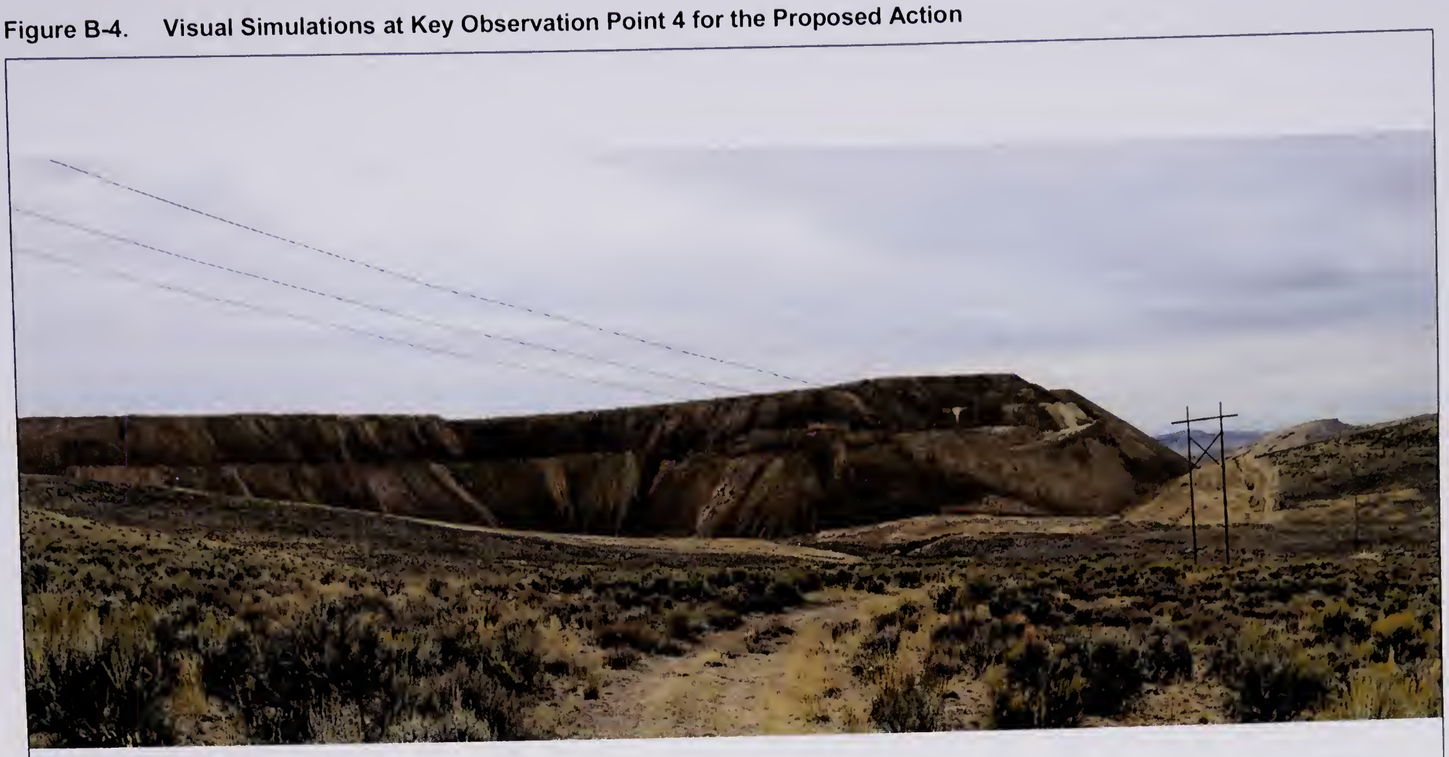
Figure B-3. Visual Simulations at Key Observation Point 3 for the Proposed Action

Existing Condition

Proposed Post-Mining Condition

Proposed Reclaimed Condition

Figure B-4. Visual Simulations at Key Observation Point 4 for the Proposed Action

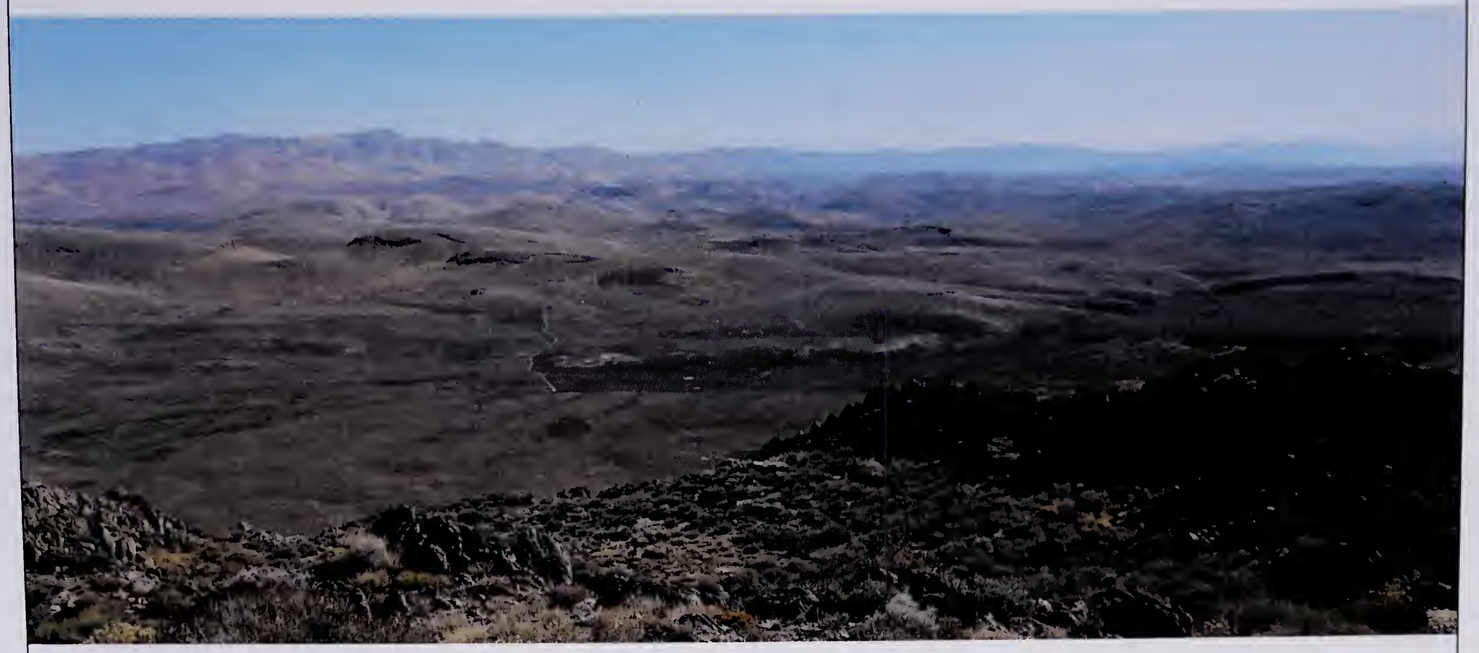


Existing Condition

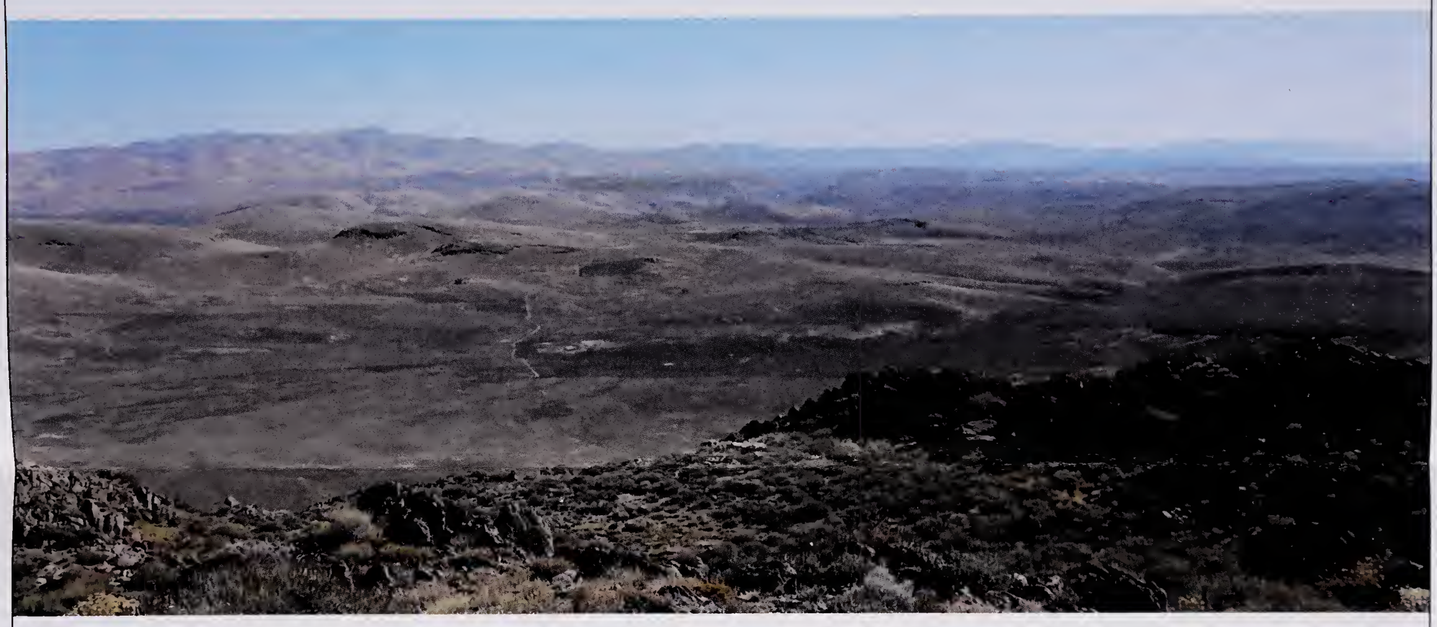
Proposed Post-Mining Condition

Proposed Reclaimed Condition

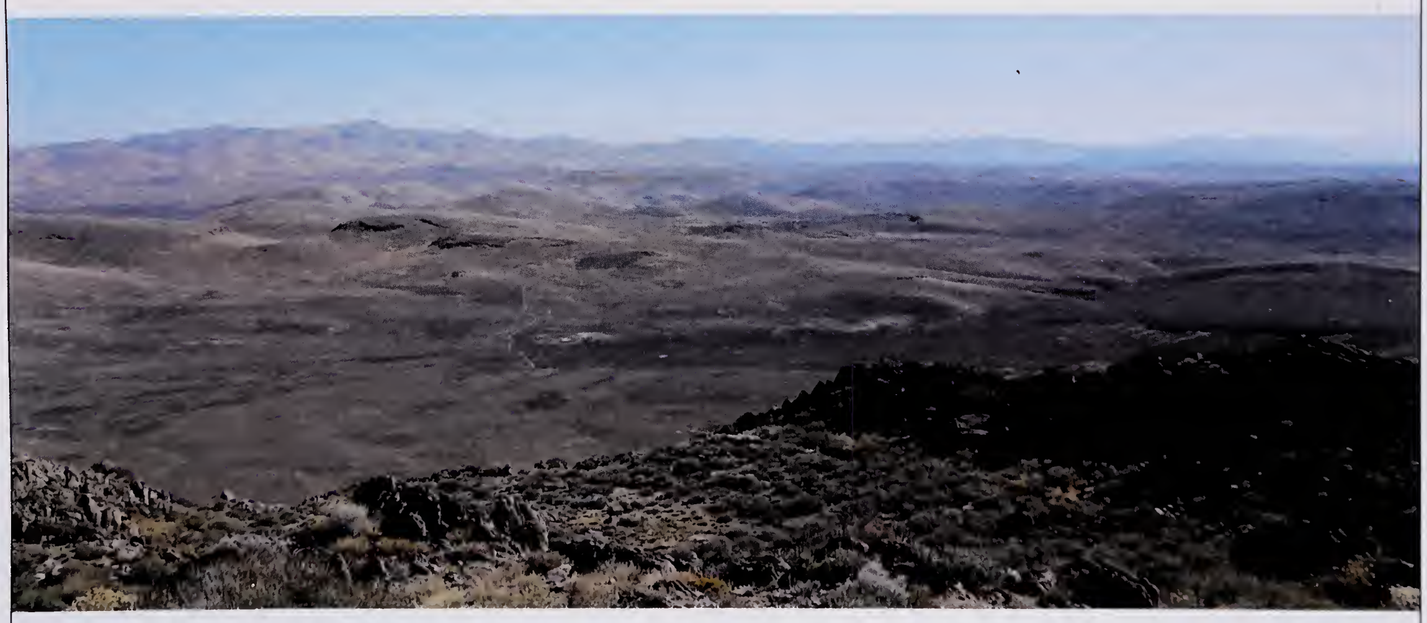
Figure B-5. Visual Simulations at Key Observation Point 5 for the Proposed Action



Existing Condition



Proposed Post-Mining Condition



Proposed Reclaimed Condition

Figure B-6. Visual Simulations at Key Observation Point 1 for the Reconfiguration Alternative

Existing Condition

Proposed Post-Mining Condition

Proposed Reclaimed Condition

Figure B-7. Visual Simulations at Key Observation Point 2 for the Reconfiguration Alternative

Existing Condition

Proposed Post-Mining Condition

Proposed Reclaimed Condition

Figure B-8. Visual Simulations at Key Observation Point 3 for the Reconfiguration Alternative

Existing Condition

Proposed Post-Mining Condition

Proposed Reclaimed Condition

Figure B-9. Visual Simulations at Key Observation Point 4 for the Reconfiguration Alternative

Existing Condition

Proposed Post-Mining Condition

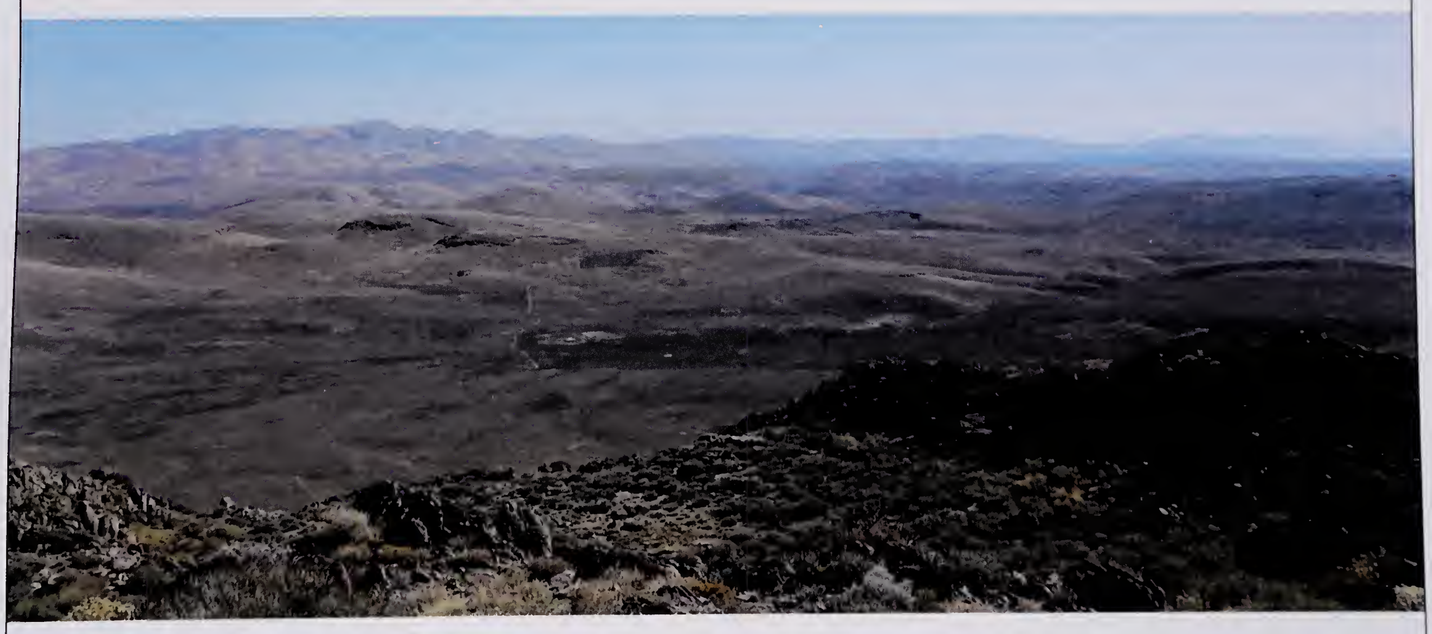
Proposed Reclaimed Condition

Note: No differences between the Proposed Action and the Reconfiguration Alternative would be visible from this location. Therefore, these are the same renderings shown for the Proposed Alternative.

Figure B-10. Visual Simulations at Key Observation Point 5 for the Reconfiguration Alternative

Existing Condition

Proposed Post-Mining Condition



Proposed Reclaimed Condition

ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX C

VIEWSHED ANALYSES

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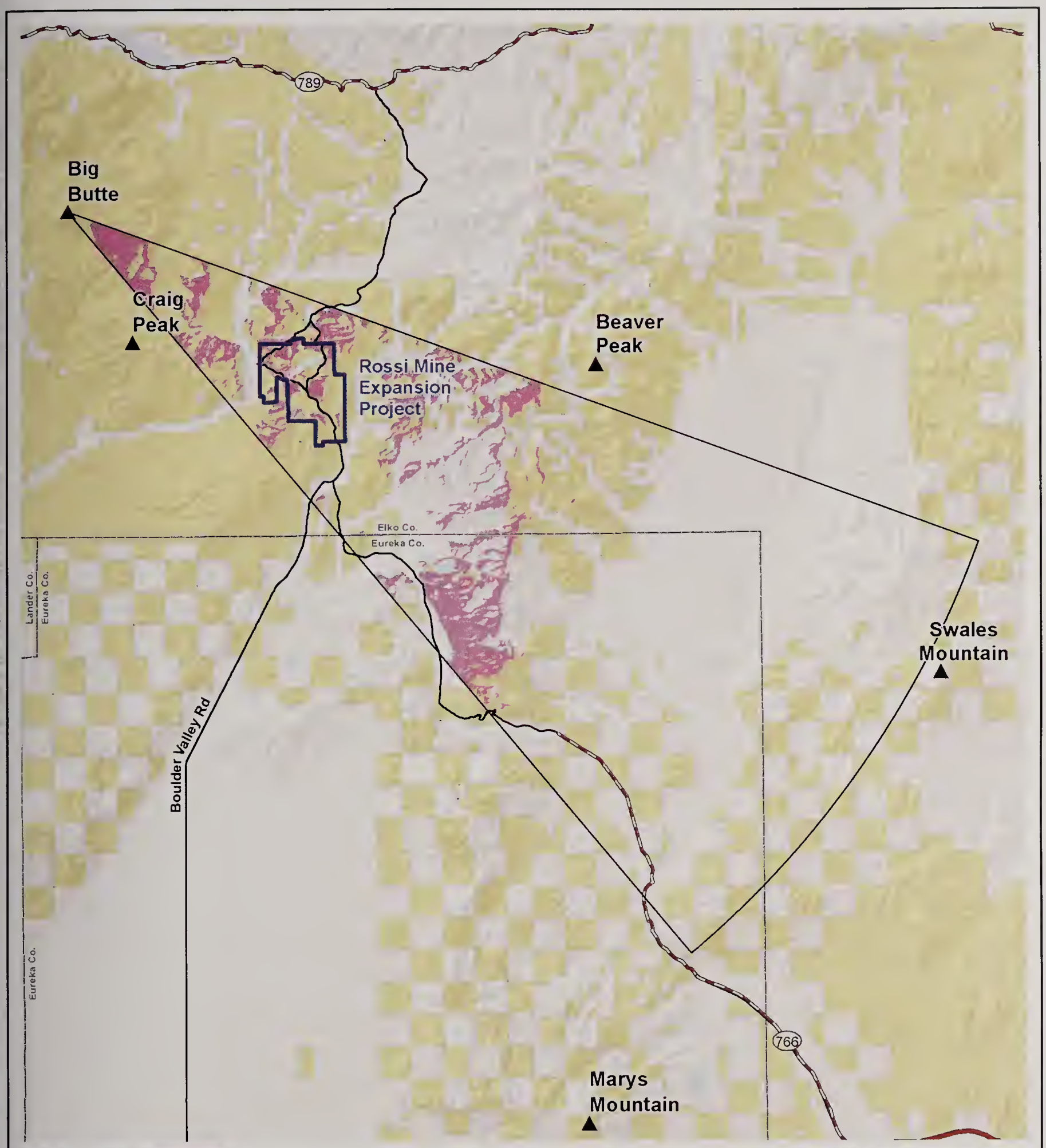
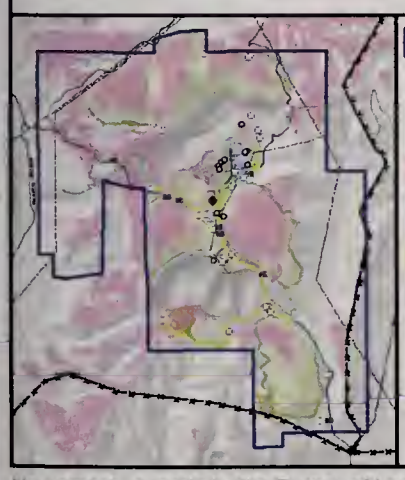




Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Big Butte[2]

Land Status

Bureau of Land Management
Private

[1] Field of view is 30° wide and 30 miles deep.
[2] Observation point is 2 meters above the highest point of the mountain summit.

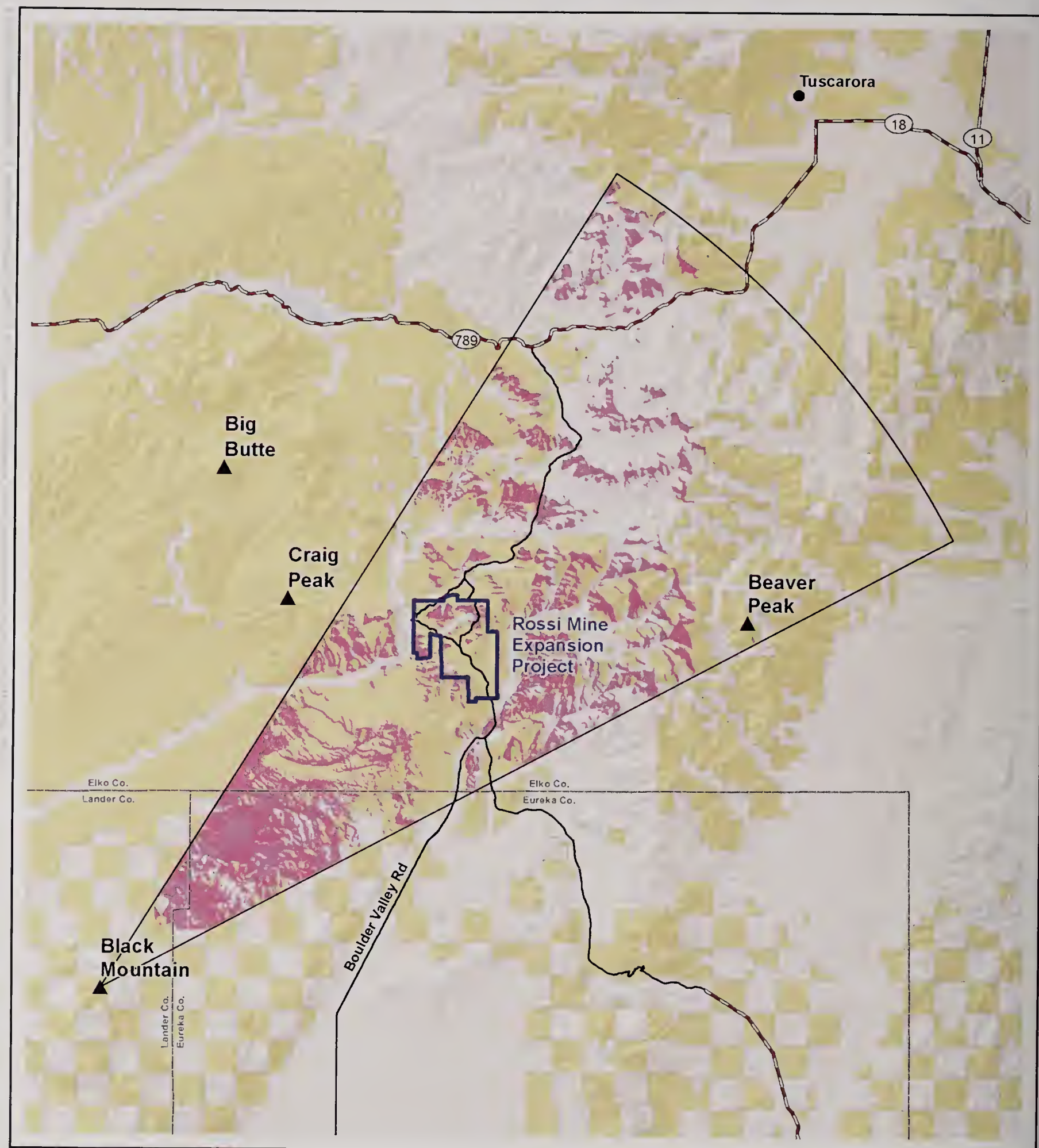
Rossi Mine Expansion Project EIS

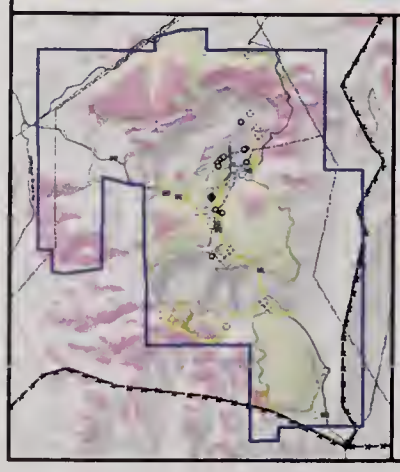
Figure 1

Areas visible from the Summit of Big Butte (Proposed Action)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N





Mine Boundary (Proposed)

Key Summit

Viewshed Analysis Area[1]

Area Visible from Black Mountain[2]

Land Status

Bureau of Land Management

Private

[1] Field of view is 30° wide and 30 miles deep

[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

Figure 2

Areas visible from the Summit of Black Mountain (Proposed Action)

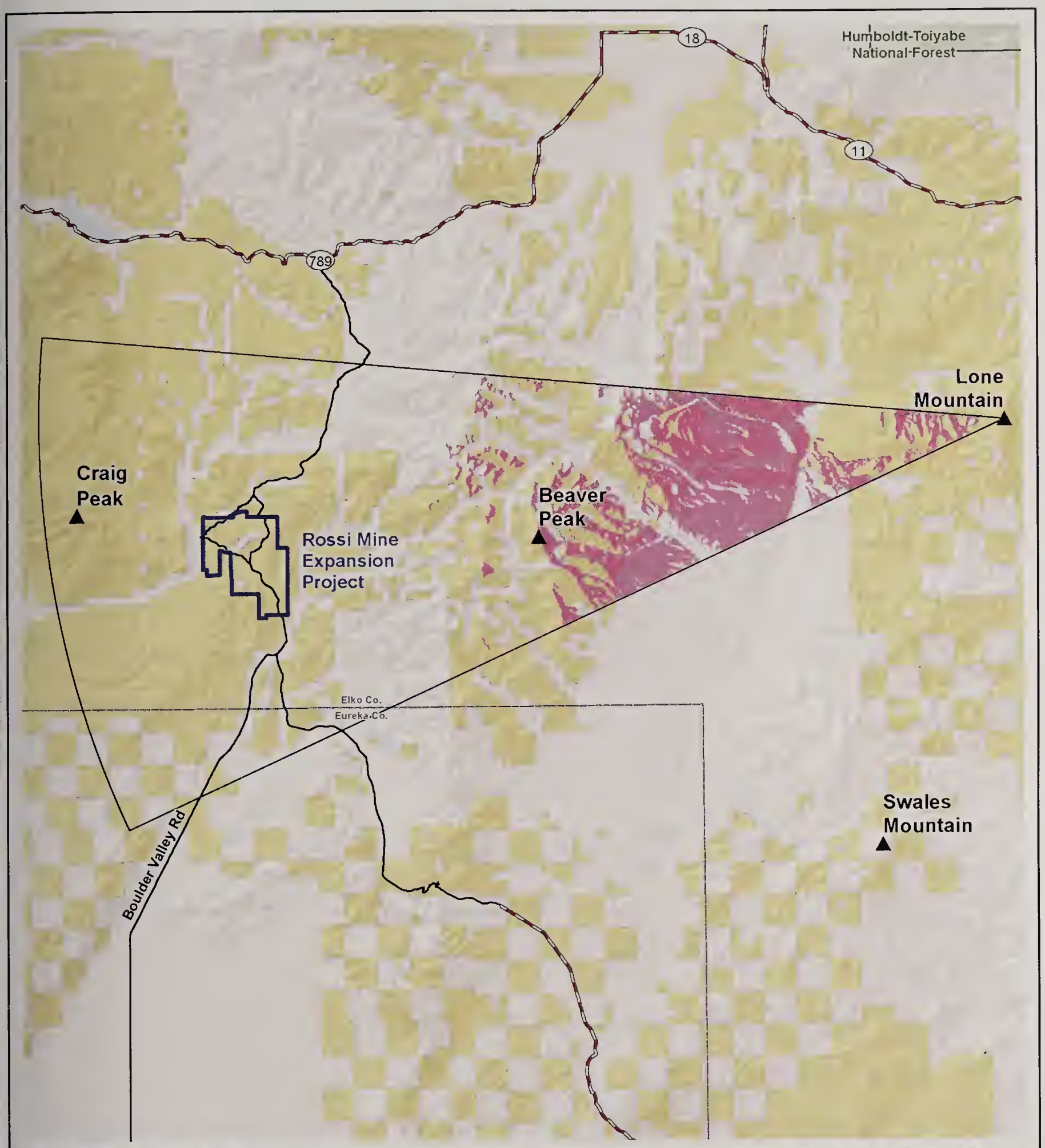
0 1 2 3 4 5 Miles

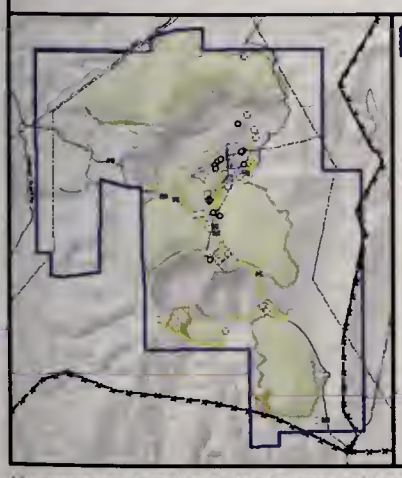
0 1 2 3 4 5 Kilometers

1:290,000

N

2/21/2018





Mine Boundary (Proposed)

Key Summit

Viewshed Analysis Area[1]

Area Visible from Lone Mountain[2]

Land Status

Bureau of Land Management

Forest Service

Private

[1] Field of view is 30° wide and 30 miles deep.

[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

Figure 3

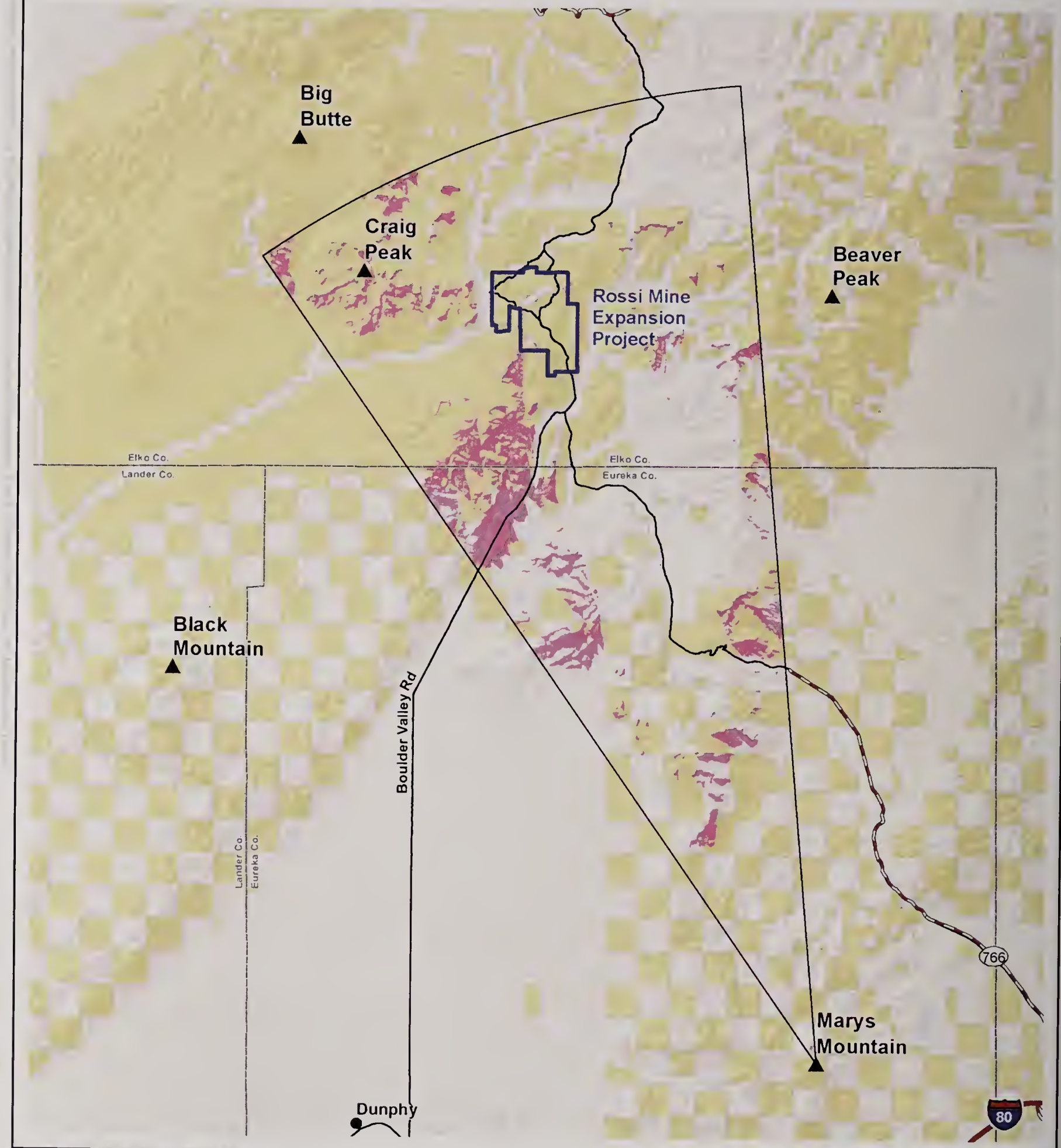
Areas visible from the Summit of Lone Mountain (Proposed Action)

0 1 2 3 4 5 Miles

0 1 2 3 4 5 Kilometers

1:290,000

N



Mine Boundary (Proposed)

Key Summit

Viewshed Analysis Area[1]

Area Visible from Marys Mountain[2]

Land Status

Bureau of Land Management

Private

[1] Field of view is 30° wide and 30 miles deep

[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

Figure 4

Areas visible from the Summit of Marys Mountain (Proposed Action)

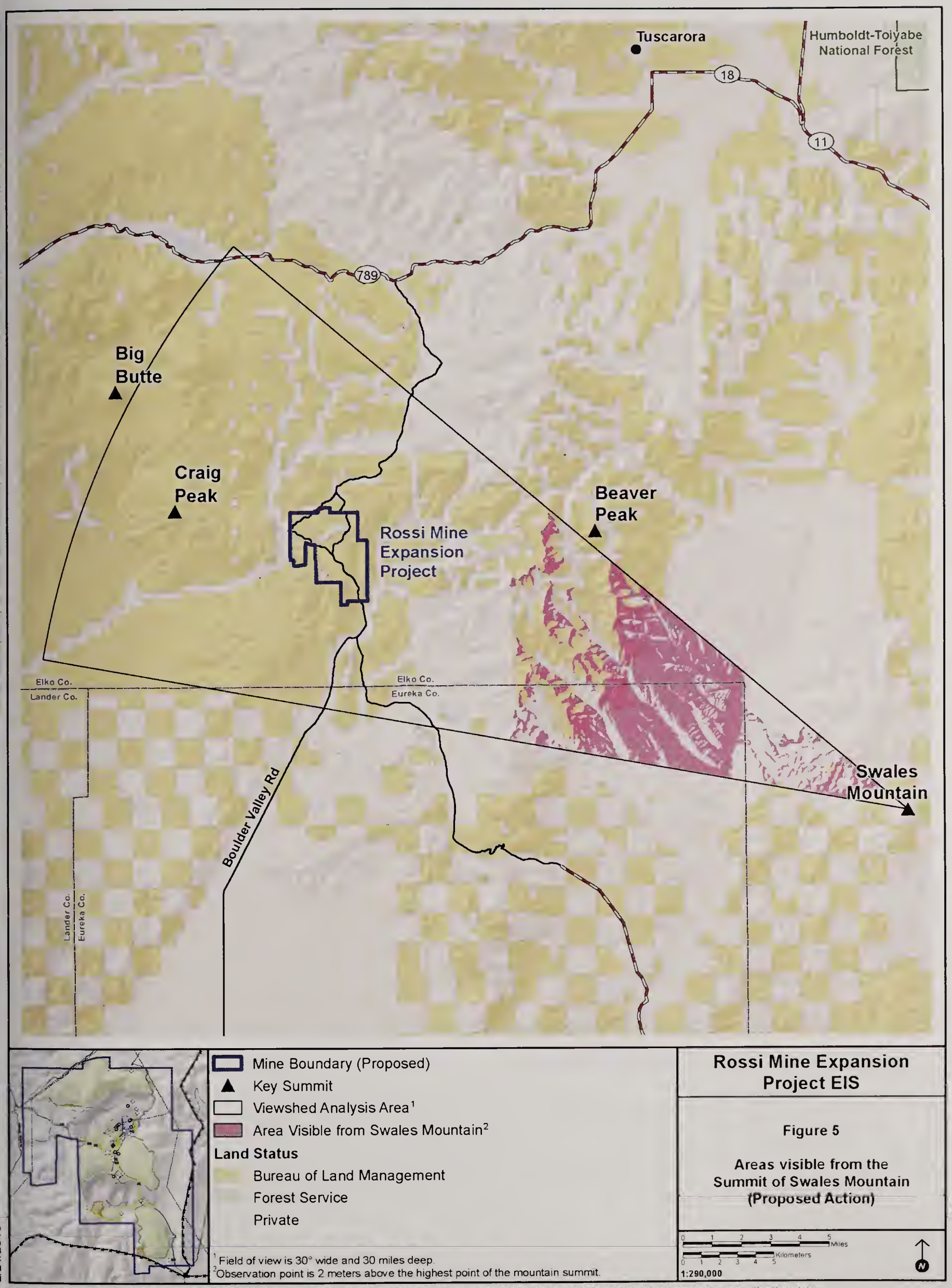
0 1 2 3 4 5 Miles

0 1 2 3 4 5 Kilometers

1:290,000

N

2/21/2018



Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Swales Mountain[2]

Land Status

Bureau of Land Management
Forest Service
Private

[1] Field of view is 30° wide and 30 miles deep.
[2] Observation point is 2 meters above the highest point of the mountain summit.

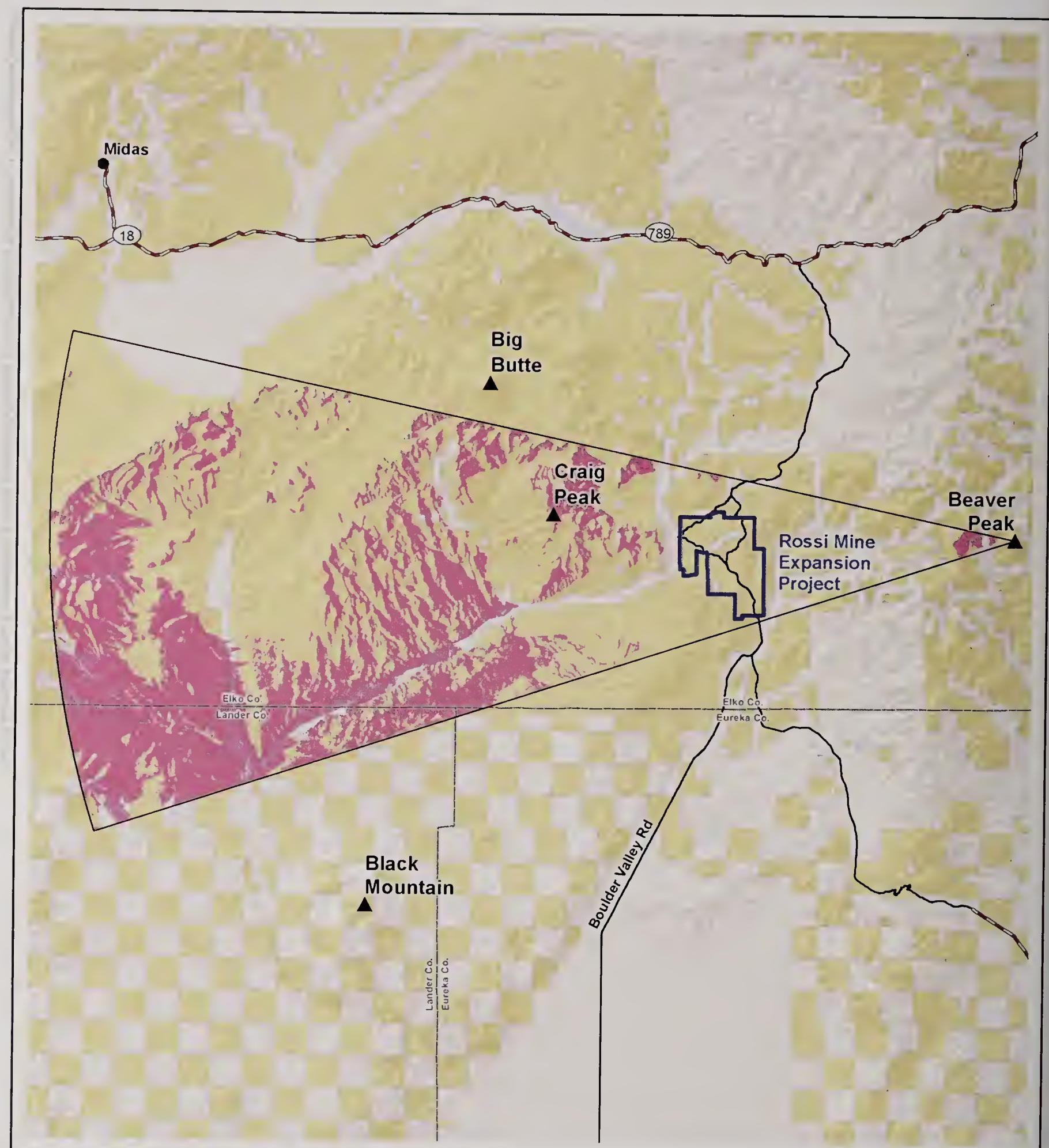
Rossi Mine Expansion Project EIS

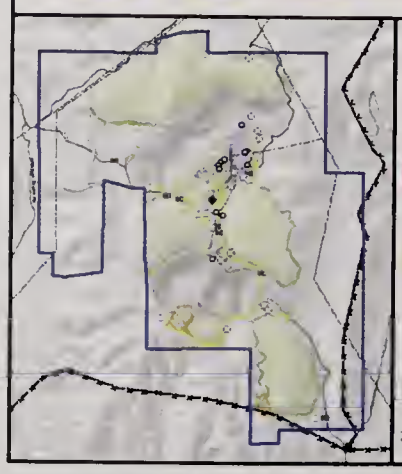
Figure 5

Areas visible from the Summit of Swales Mountain (Proposed Action)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N





Mine Boundary (Proposed)

Key Summit

Viewshed Analysis Area[1]

Area Visible from Beaver Peak[2]

Land Status

Bureau of Land Management

Private

[1] Field of view is 30° wide and 30 miles deep

[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

Figure 6

Areas visible from the Summit of Beaver Peak (Proposed Action)

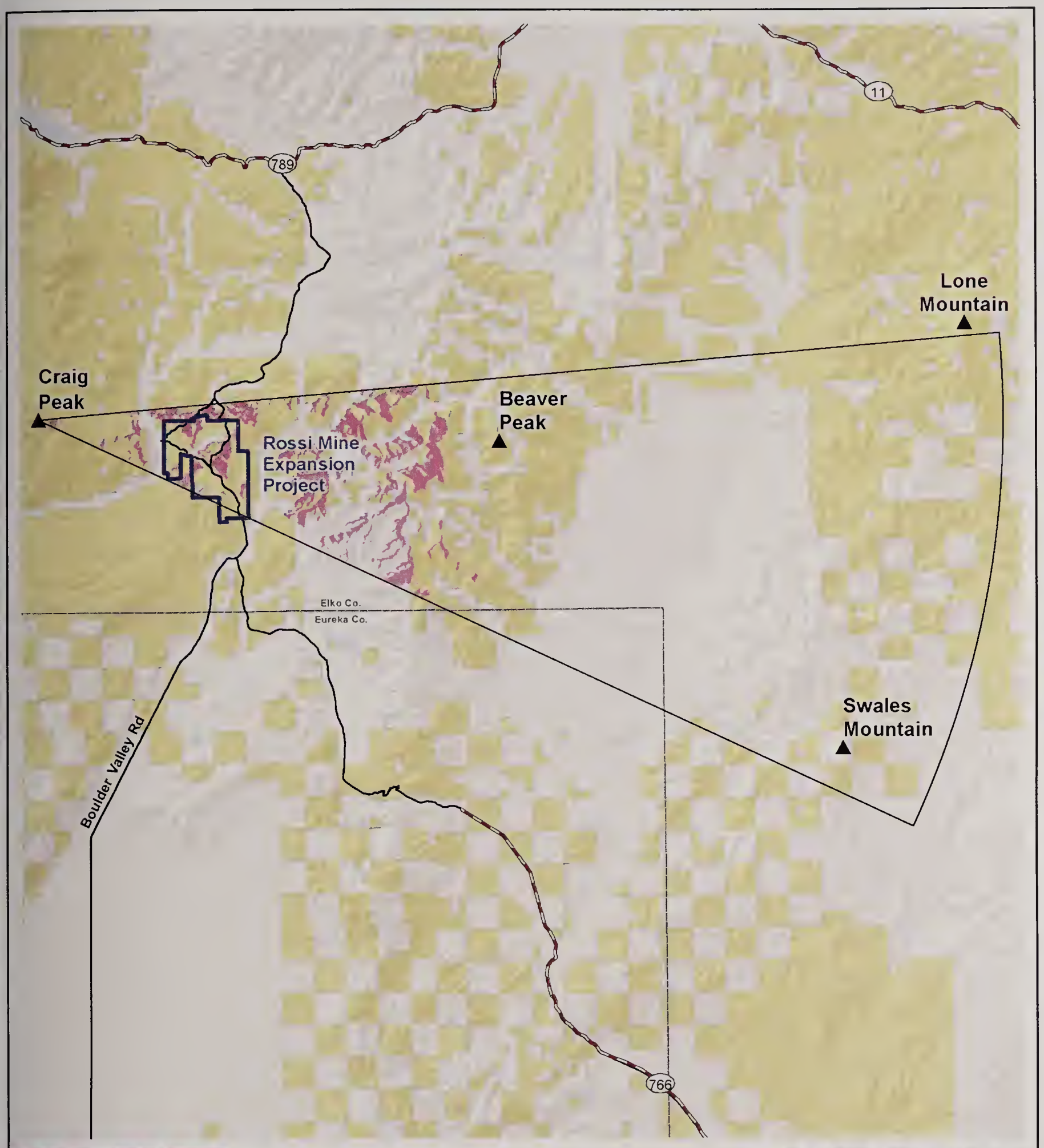
0 1 2 3 4 5 Miles

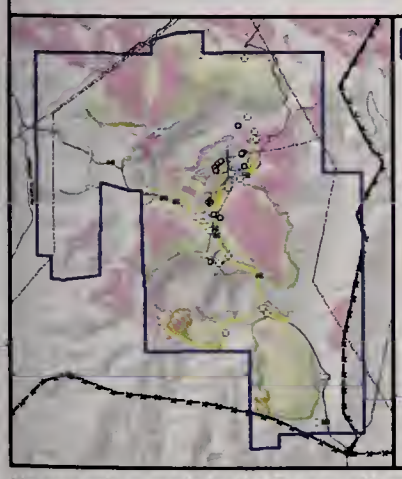
0 1 2 3 4 5 Kilometers

1:290,000

N

2/21/2018





Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Craig Peak[2]

Land Status

Bureau of Land Management
Private

[1] Field of view is 30° wide and 30 miles deep.
[2] Observation point is 2 meters above the highest point of the mountain summit.

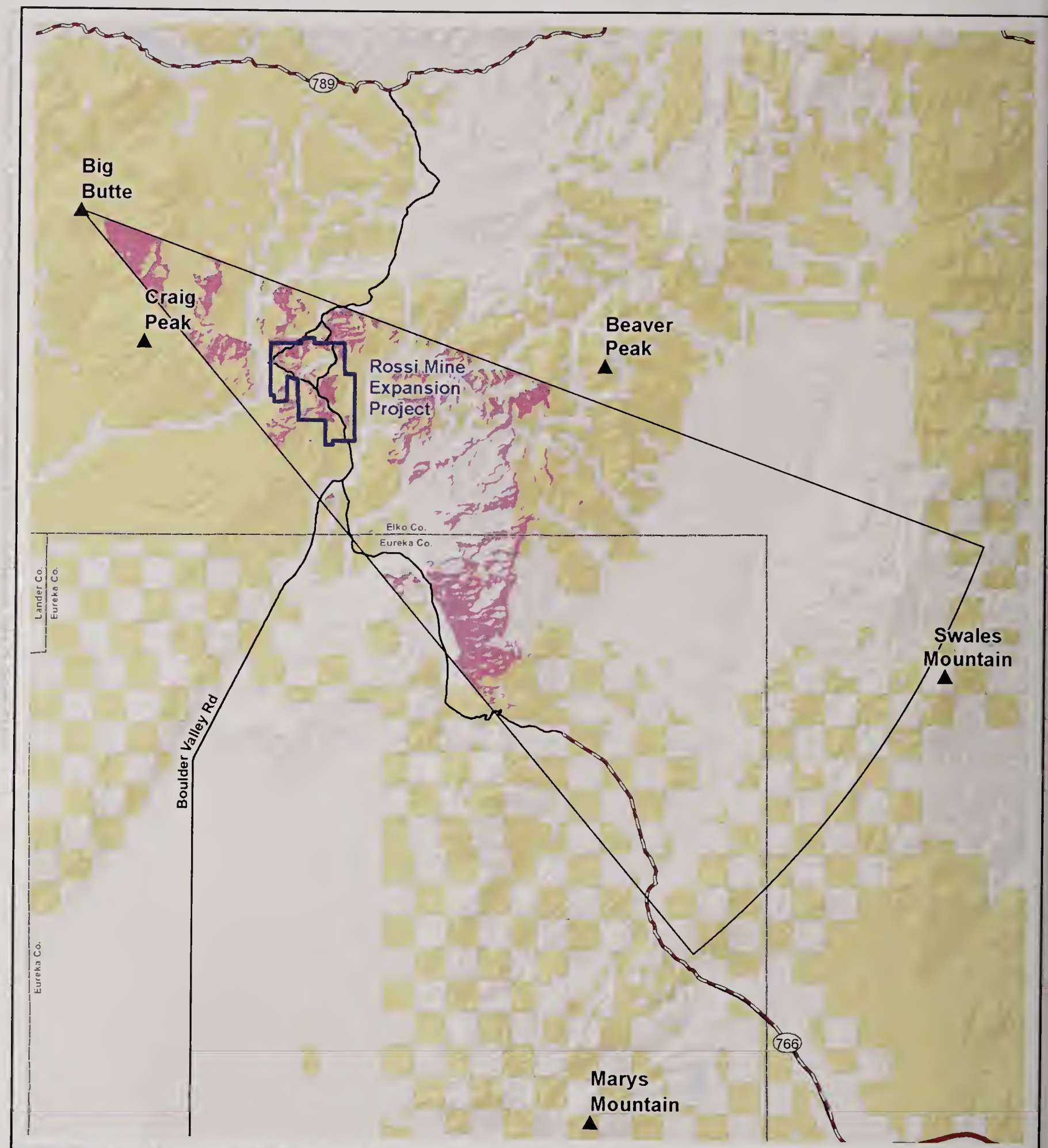
Rossi Mine Expansion Project EIS

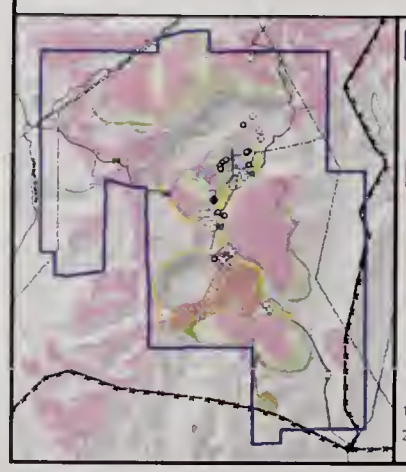
Figure 7

Areas visible from the Summit of Craig Peak (Proposed Action)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N





Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Big Butte[2]

Land Status

Bureau of Land Management
Private

[1] Field of view is 30° wide and 30 miles deep
[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

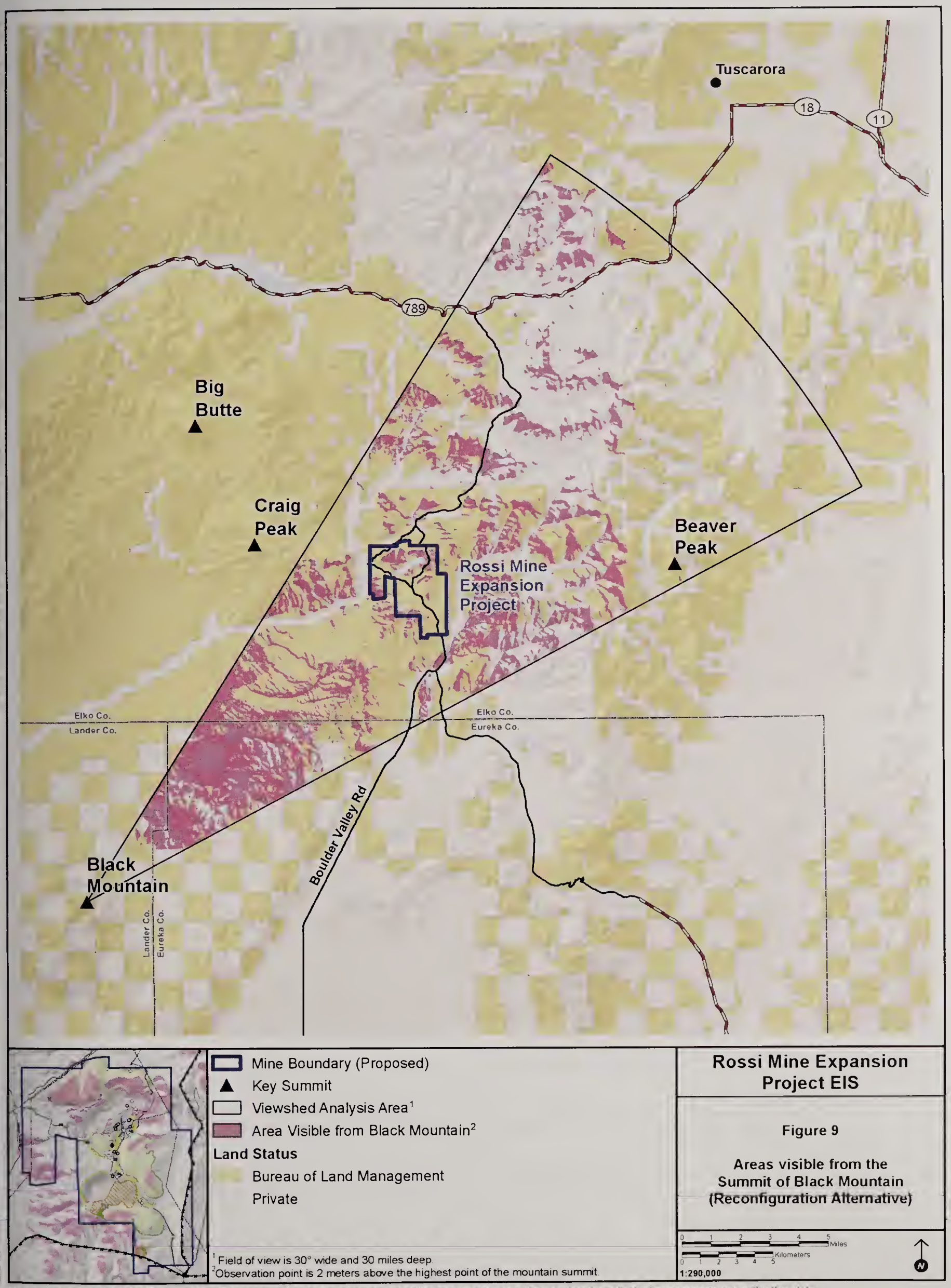
Figure 8

Areas visible from the Summit of Big Butte (Reconfiguration Alternative)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N

2/21/2018



Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Black Mountain[2]

Land Status

Bureau of Land Management
Private

[1] Field of view is 30° wide and 30 miles deep.
[2] Observation point is 2 meters above the highest point of the mountain summit.

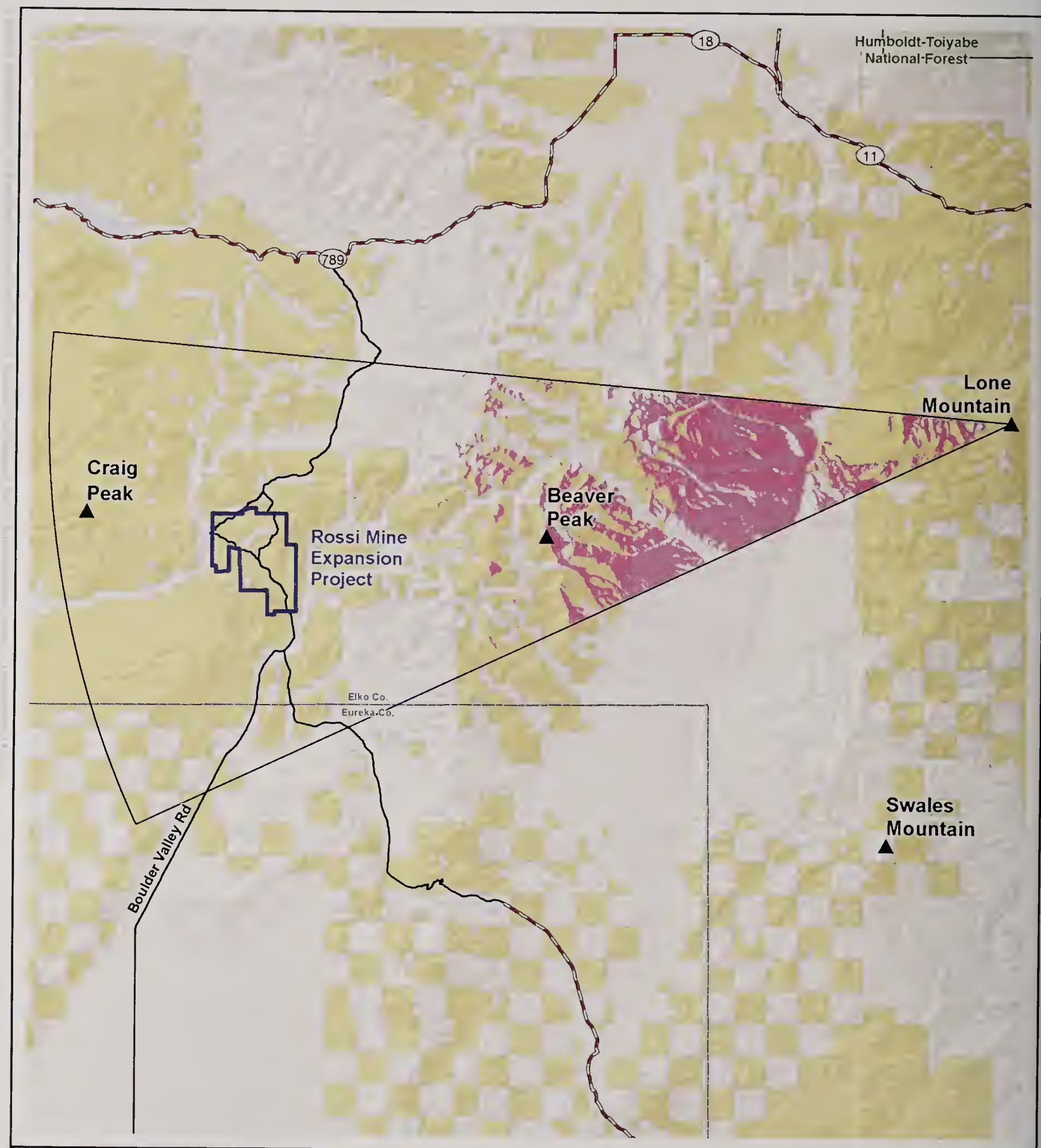
Rossi Mine Expansion Project EIS

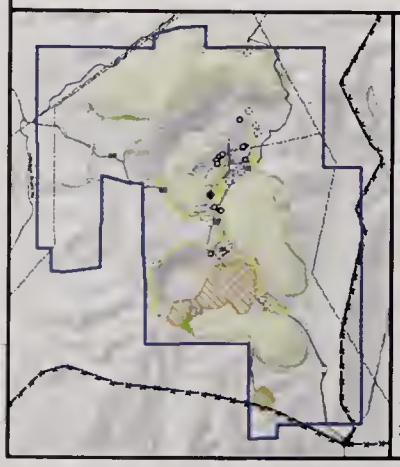
Figure 9

Areas visible from the Summit of Black Mountain (Reconfiguration Alternative)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N





Mine Boundary (Proposed)

Key Summit

Viewshed Analysis Area[1]

Area Visible from Lone Mountain[2]

Land Status

Bureau of Land Management

Forest Service

Private

[1] Field of view is 30° wide and 30 miles deep

[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

Figure 10

Areas visible from the Summit of Lone Mountain (Reconfiguration Alternative)

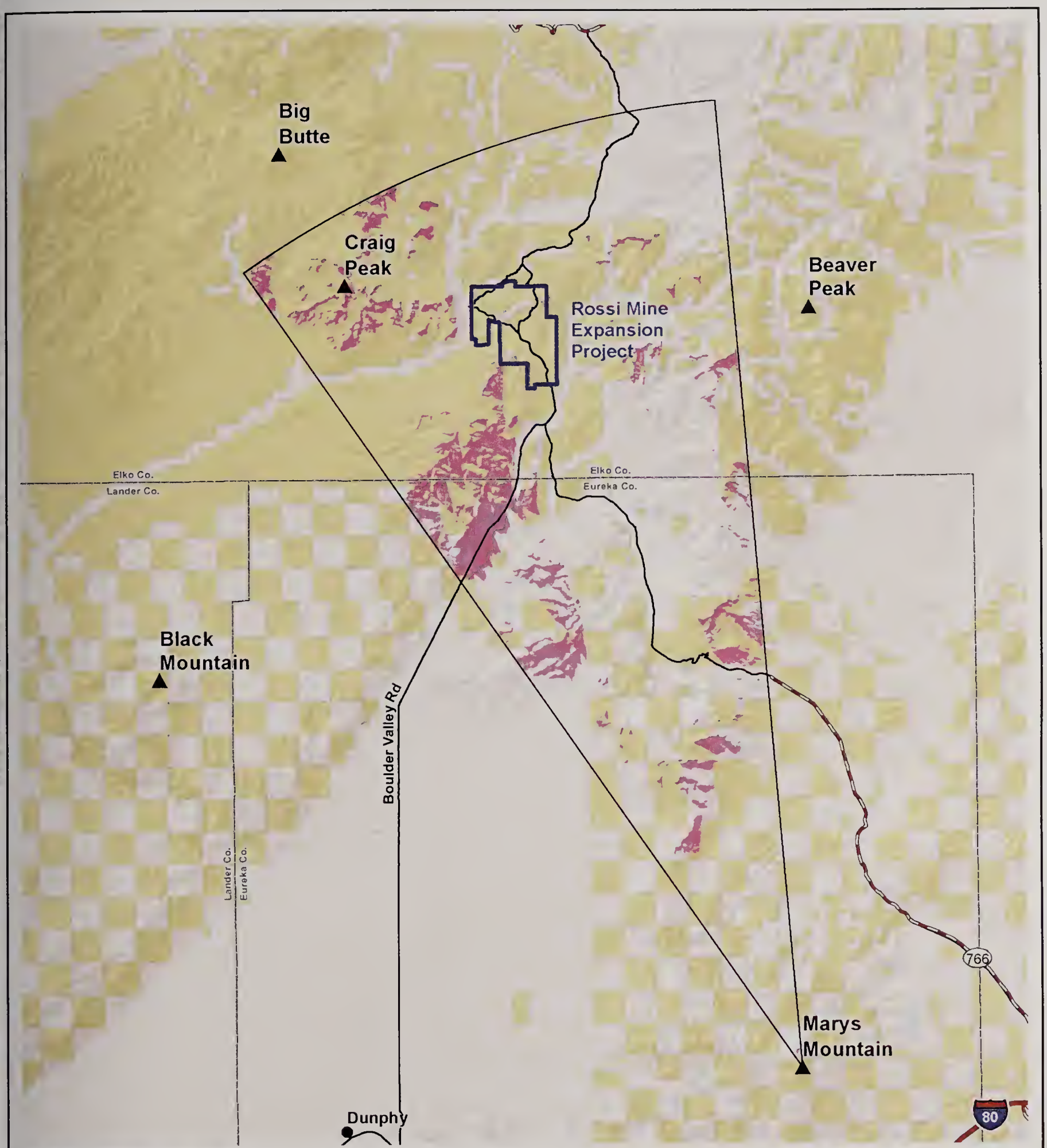
0 1 2 3 4 5 Miles

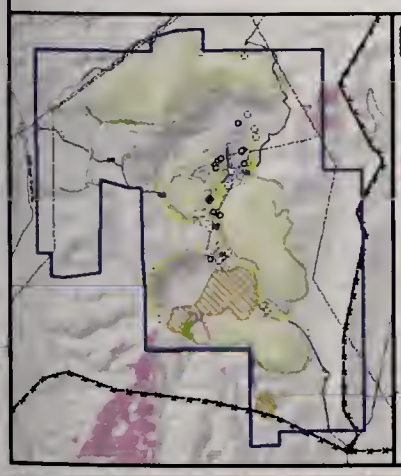
0 1 2 3 4 5 Kilometers

1:290,000

N

2/21/2018





Mine Boundary (Proposed)

Key Summit

Viewshed Analysis Area[1]

Area Visible from Marys Mountain[2]

Land Status

Bureau of Land Management

Private

[1] Field of view is 30° wide and 30 miles deep.

[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

Figure 11

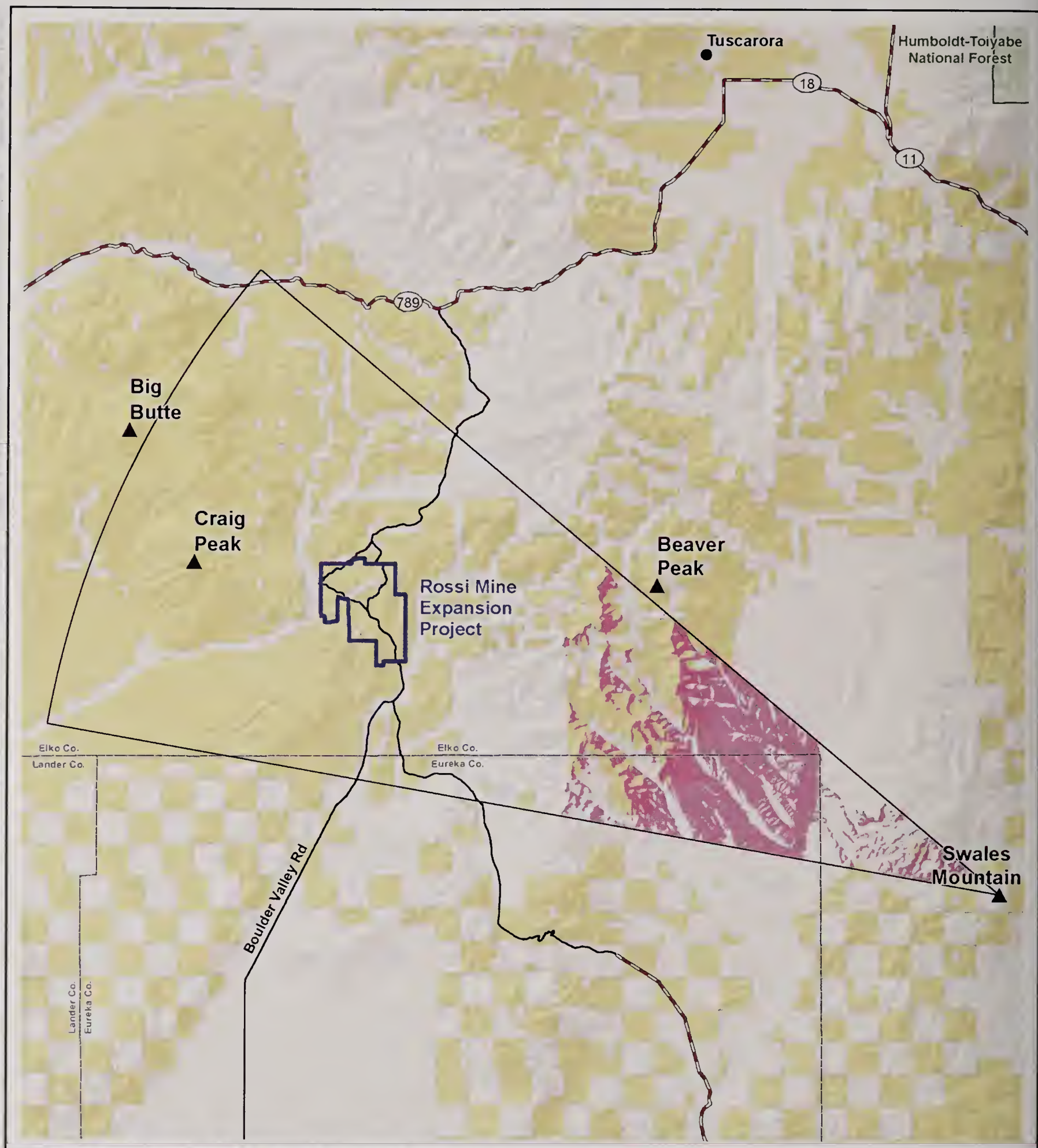
Areas visible from the Summit of Marys Mountain (Reconfiguration Alternative)

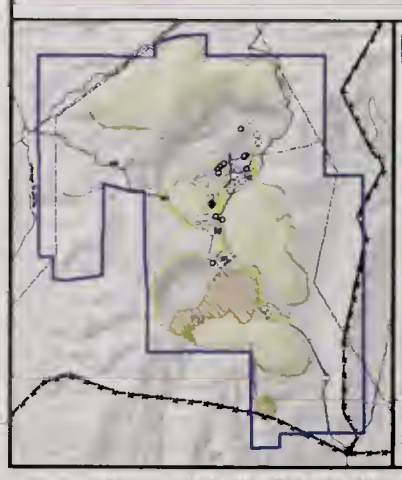
0 1 2 3 4 5 Miles

0 1 2 3 4 5 Kilometers

1:290,000

N





Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Swales Mountain[2]

Land Status

Bureau of Land Management
Forest Service
Private

[1] Field of view is 30° wide and 30 miles deep.
[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

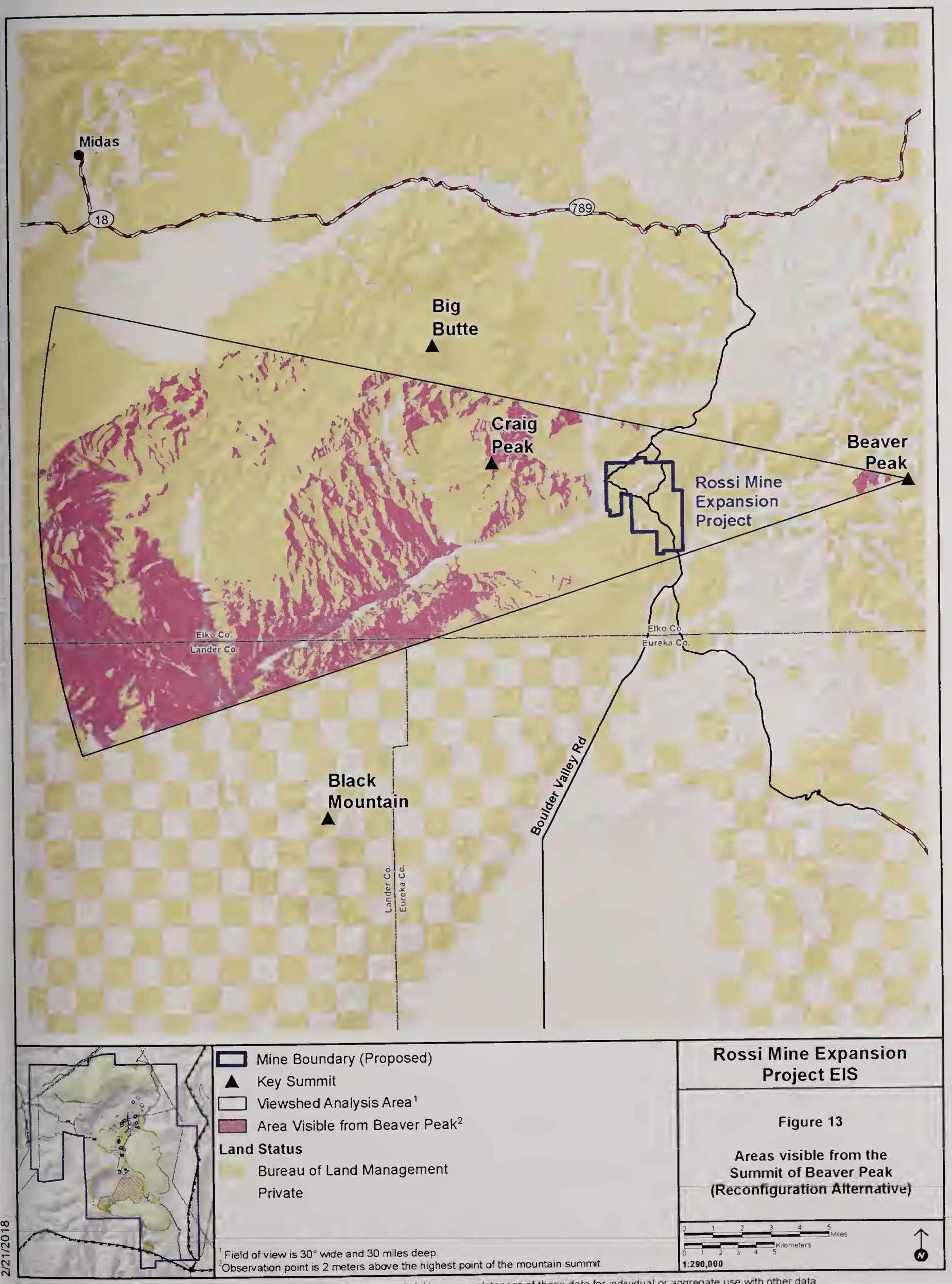
Figure 12

Areas visible from the Summit of Swales Mountain (Reconfiguration Alternative)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N

2/21/2018



Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Beaver Peak[2]

Land Status

Bureau of Land Management
Private

[1] Field of view is 30° wide and 30 miles deep.
[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

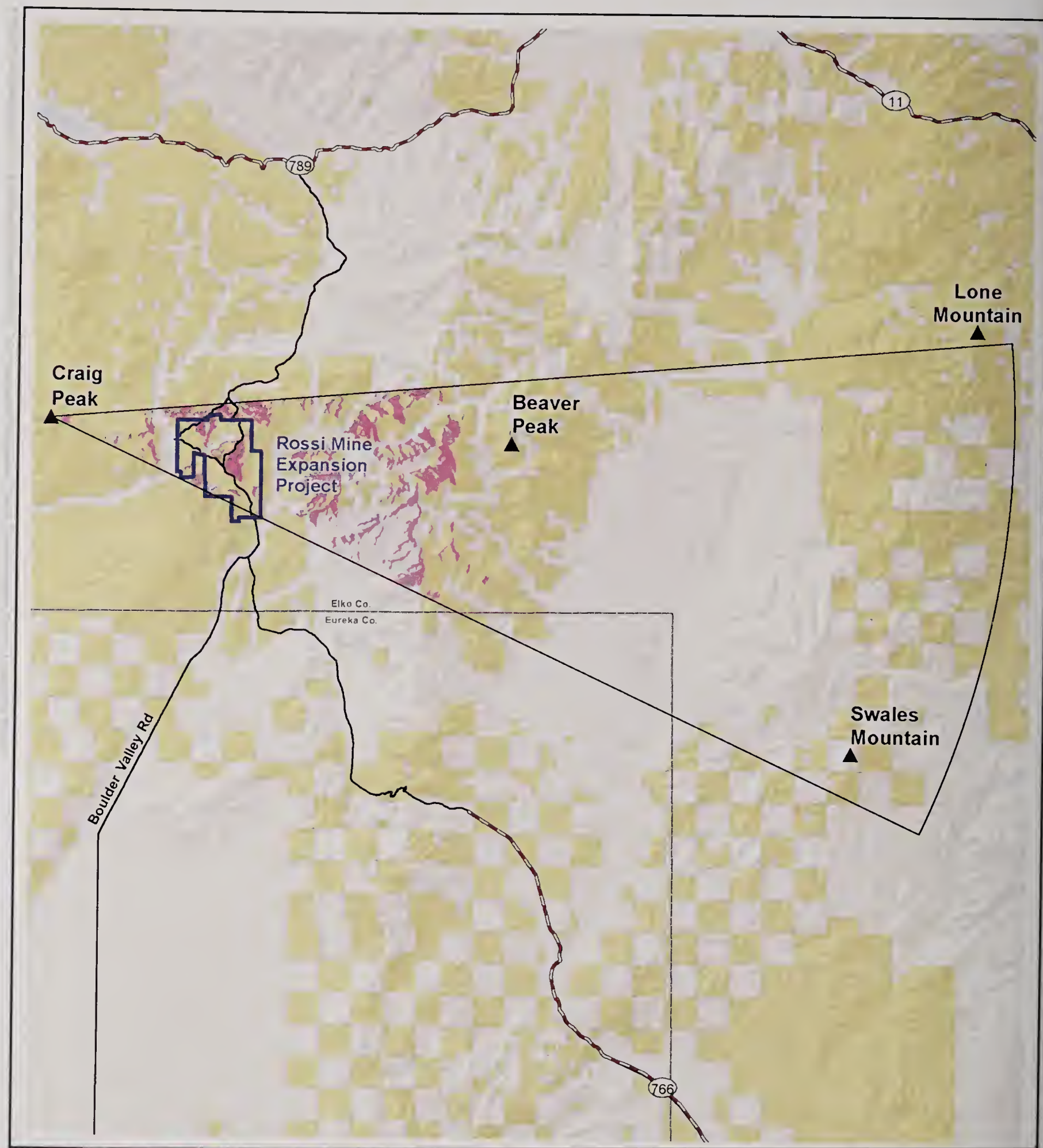
Figure 13

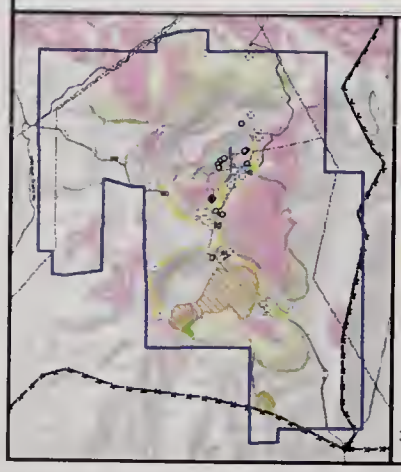
Areas visible from the Summit of Beaver Peak (Reconfiguration Alternative)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N

2/21/2018





Mine Boundary (Proposed)
Key Summit
Viewshed Analysis Area[1]
Area Visible from Craig Peak[2]

Land Status

Bureau of Land Management
Private

[1] Field of view is 30° wide and 30 miles deep
[2] Observation point is 2 meters above the highest point of the mountain summit.

Rossi Mine Expansion Project EIS

Figure 14

Areas visible from the Summit of Craig Peak (Reconfiguration Alternative)

0 1 2 3 4 5 Miles
0 1 2 3 4 5 Kilometers
1:290,000

N

2/21/2018

ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX D

SPECIAL-STATUS SPECIES OCCURRENCE TABLE

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Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Mammals					
Ash Mountain meadow vole *Microtus montanus nevadensis*	BLM	Range: Nye County, Nevada and the Upper Amargosa Watershed. Habitat: Alpine meadows, occupies shallow burrows and surface runways.	None. This species is possibly extirpated; there are historic records of this species in the watershed.	Yes. No suitable habitat occurs within the study area.	NatureServe 2015
Big brown bat *Eptesicus fuscus*	BLM	Range: Throughout Nevada. Habitat: Occurs in a variety of habitats including forest, shrubland, agricultural, and urban areas. Roosts in a variety of structures such as mines, caves, buildings, and trees. More tolerant of humans and human-made landscapes than other bat species.	Moderate. This species has been documented northeast of the study area and suitable foraging and roosting habitat occurs within the study area; however, no big brown bats were detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006
Brazilian free-tailed bat *Tadarida brasiliensis*	BLM, NV-SP	Range: Throughout Nevada. Habitat: Occurs in a variety of habitats including dry grassland and sagebrush shrubland, forest edges, and willow-dominated riparian areas and marshes. Roosts in caves, mines, trees, bridges, and buildings.	High. This species has been recorded in the project area at a rock outcrop in a draw in Township 37 North, Range 49 East, northeast corner of Section 21 during acoustic surveys on May 29, 2012.	No.	Bradley et al. 2006
California myotis *Myotis californicus*	BLM	Range: Throughout Nevada. Habitat: Occurs in a variety of habitats from desert scrub to forests. Roosts in a variety of structures including mines, caves, buildings, and trees.	High. This species has likely been documented in the study area at a stock pond and a dry pond in Township 37 North, Range 49 East, northwest corner of Section 22 during acoustic surveys on May 28, 2012.	No.	Bradley et al. 2006
Fringed myotis *Myotis thysanodes*	BLM, NV-SP	Range: Throughout Nevada. Habitat: Occurs in a variety of habitats from low desert scrub to high elevation coniferous forests. Roosts in mines, caves, trees, and buildings.	Low. This species is widely distributed but rare in Nevada, only a few records from central and southern Nevada are documented.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Hidden Forest Uinta chipmunk *Neotamias umbrinus nevadensis*	NV-SPS	Range: Clark County, Nevada and Las Vegas Wash. Habitat: Occurs in coniferous forests and is often found near logs and brush in open areas and at the edge of forests.	None.	Yes. No suitable habitat occurs within the study area.	Linzey and NatureServe 2008
Hoary bat *Lasiurus cinereus*	BLM	Range: Patchy distribution throughout Nevada. Habitat: Occurs primarily in forested upland habitats, forest riparian areas, and agricultural habitats. This species typically roosts in trees.	Low. Marginal roosting and foraging habitat occurs within the study area and no hoary bats were detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006
Little brown myotis *Myotis lucifugus*	BLM	Range: The northern part of Nevada. Habitat: Occurs in coniferous forests and near water sources. Roosts in trees, rock outcrops, buildings, and occasionally mines and caves.	High. This species has been recorded at stock ponds and rock outcrops during acoustic surveys in the study area on May 28, July 10, and July 11, 2012.	No.	Bradley et al. 2006
Long-eared myotis *Myotis evotis*	BLM	Range: Throughout Nevada, primarily at higher elevations. Habitat: Occurs in ponderosa pine and higher elevation coniferous forest and occasionally in sagebrush and desert scrub. Roosts in trees, small rock outcrops, mines, caves, and buildings.	Low. Marginal foraging habitat occurs within the study area and long-eared myotis was not detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006
Long-legged myotis *Myotis volans*	BLM	Range: Throughout Nevada, more widespread in the northern half of the state. Habitat: Occurs in piñon-juniper and other montane coniferous forest habitats. Roosts in trees, rock crevices, caves, mines, and buildings.	Low. Marginal foraging habitat occurs within the study area and long-legged myotis was not detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Pallid bat *Antrozous pallidus*	BLM	Range: Throughout Nevada. Habitat: Occurs in a variety of habitats from low desert to shrubland, to forests. Roosts in rock outcrops, mines, caves, trees, buildings, and bridges.	Moderate. Suitable foraging and roosting habitat does exist in the study area; however pallid bat was not detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006
Pygmy rabbit *Brachylagus idahoensis*	BLM	Range: Central and northern Nevada. Habitat: Occurs primarily in big sagebrush dominated habitats and alluvial fans where plants occur in tall, dense clumps. This species constructs burrows in deep, loamy-type soils near shrub cover.	High. Potentially suitable habitat is present in the lower elevation drainages in the study area; however, no pygmy rabbits were observed during surveys conducted in May and July, 2012.	No.	Wildlife Action Plan Team 2012
Silver-haired bat *Lasionycteris noctivagans*	BLM	Range: Throughout Nevada. Habitat: Occurs in mature forests including coniferous and mixed deciduous/coniferous forests. Roosts in trees.	Low. Marginal foraging and roosting habitat occurs within the study area and the silver-haired bat was not detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006
Spotted bat *Euderma maculatum*	BLM, NV-ST	Range: Patchy distribution throughout Nevada. Habitat: Occurs in a variety of habitats including desert scrub, coniferous forest, piñon-juniper woodland, sagebrush, riparian, and urban areas. Roosts in crevices in cliff faces, buildings, and mines.	Low. Spotted bat is known from only 12 observed locations, none of which occur near the study area,	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006
Townsend's big-eared bat *Corynorhinus fuscus*	BLM, NV-SPS	Range: Throughout Nevada. Habitat: Occurs primarily in rural settings from deserts to mixed coniferous/deciduous forest. Roosts primarily in caves and mines and also in trees and buildings.	Moderate. Suitable foraging and roosting habitat does exist in the study area; however Townsend's big-eared bat was not detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006v

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Western pipistrelle *Pipistrellus hesperus*	BLM	Range: Throughout Nevada, more common in the western and southern portions. Habitat: Occurs in blackbrush, creosote, salt desert shrub, and sagebrush and occasionally in Ponderosa pine and piñon juniper woodlands. Roosts primarily in rock crevices but also in mines, caves, and occasionally in buildings and vegetation.	Moderate. Suitable foraging and roosting habitat does exist in the study area; however western pipistrelle was not detected by auditory surveys conducted in spring and summer, 2012.	No. Although this species has not been detected during baseline surveys, suitable foraging habitat occurs within the study area.	Bradley et al. 2006
Western mastiff bat *Euderma maculatum*	NV-SPS	Range: Only one specimen has been recorded in southern Nevada. Habitat: Occurs in a variety of habitats from desert scrub to chaparral, to montane coniferous forest. Roosts in crevices in cliff faces, cracks in boulders, and occasionally in buildings.	Low. No western mastiff bats have been recorded near the study area.	Yes. No records of this species are known from northern Nevada or near the project area.	Bradley et al. 2006
Western small-footed myotis *Myotis ciliolabrum*	BLM	Range: Throughout Nevada. Habitat: Occurs in a variety of habitats including desert scrub, grasslands, sagebrush steppe, blackbrush, greasewood, piñon-juniper woodlands, pine-fir forests, agriculture, and urban areas. Roosts in caves, mines, and trees.	High. This species has been recorded in the study area in a rock outcrop in a draw in Township 37 North, Range 49 East, northeast corner of Section 21 during acoustic surveys on May 29, 2012.	No.	Bradley et al. 2006
Western gray squirrel *Sciurus griseus*	NV-SP	Range: Western Nevada. Habitat: Occurs in open oak and pine-oak forests.	None.	Yes. No suitable habitat occurs within the study area.	NatureServe 2015
Yuma myotis *Myotis yumanensis*	BLM	Range: Western, southern, and north-central parts of Nevada. Habitat: Occurs in a variety of habitats including sagebrush, salt desert scrub, agricultural areas, and riparian habitats. Roosts in buildings, trees, mines, caves, bridges, and rock crevices.	High. This species has been recorded in the study area around stock ponds during acoustic surveys on May 28, 2012.	No.	Bradley et al. 2006

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Birds					
Bald eagle *Haliaeetus leucocephalus*	BLM	Range: Throughout Nevada. Habitat: Usually nests in tall trees or on cliffs near bodies of water that provide a food base. Nest trees include pines, spruce, firs, and cottonwoods. Breeding period is between February 15 and July 15.	Moderate. Occurrence within the study area would be limited to migrating and foraging individuals.	No. Suitable foraging and/or winter habitat occurs within the study area; however, no nests or individuals were identified during baseline surveys.	Wildlife Action Plan Team 2012, Great Basin Ecology 2009
Black rosy-finch *Leucosticte atrata*	BLM	Range: Winters throughout central and northern Nevada. Breeds in the highest mountains of Elko, Humboldt, and White Pine counties. Habitat: Occurs in barren, rocky, or grassy areas and cliffs among glaciers or beyond timberline. Nests in rock crevices or holes in cliffs above snow fields. Breeding period is late June through July.	None.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Brewer's sparrow *Spizella breweri*	BLM	Range: Breeds throughout northern Nevada, year-round resident in southwest Nevada, winter resident in extreme southeast Nevada. Habitat: Occurs in sagebrush habitats. Nests in the dense crown of a tall shrub about 2 feet off the ground. Breeding period is mid-April to early August.	High. This species was observed during breeding bird surveys in the study area and there is suitable nesting, breeding, and foraging habitat present.	No.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Ferruginous hawk *Buteo regalis*	BLM	Range: Throughout Nevada. Habitat: Occurs in open country, sagebrush, saltbush greasewood shrubland, and the edge of piñon-juniper woodland. Nests in isolated trees, ledges, poles, and the ground. Breeding period is March to August.	Moderate. No nest sites have been documented within the study area, this species would likely use the study area for foraging.	No. Suitable year-round habitat occurs within the study area; however, no nests or individuals were identified during baseline surveys.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Golden eagle *Aquila chrysaetos*	BLM	Range: Throughout Nevada. Habitat: Occurs in open country in prairies, alpine areas, open wooded country, and barren areas in hilly or mountainous regions. Nests on rock ledges, cliffs, and occasionally in large trees. Breeding period is late January to August.	High. No known nests occur within the study area; however four active nests were identified within 10 miles of the study area.	No.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Greater sage-grouse *Centrocercus urophasianus*	BLM	Range: Throughout Nevada in areas with sagebrush. Habitat: Sagebrush grasslands. Leks are located on open sites surrounded by sagebrush or exposed ridges, knolls, or grassy swales. Nests in thick cover in sagebrush habitat and shallow depressions in the ground. Breeding period is early March to late July.	High. No sage-grouse, sage-grouse leks, or nests occur within the study area; however, there are four leks are located within a 3-mile radius of the study area and have been observed at the Little Coyote Creek 12 lek as recently as spring 2015.	No.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Lewis woodpecker *Melanerpes lewis*	BLM	Range: A year-round resident in northern Nevada, summer resident in northeast Nevada. Habitat: Occurs in open ponderosa pine forests, riparian woodlands dominated by cottonwood, and logged or burned conifer forests. Nests in natural cavities of trees or abandoned northern flicker holes. Breeding period is mid-May to early September.	Low. Suitable nesting and foraging habitat is lacking within the study area.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Loggerhead shrike *Lanius ludovicianus*	BLM	Range: Throughout Nevada. Habitat: Occurs in open country with scattered trees and shrubs, desert scrub, and occasionally, open woodland. Nests and forages in brushy areas. Breeding period is mid-April to mid-July.	High. There is suitable habitat in the study area for this species, and loggerhead shrike was observed during breeding bird surveys.	No.	Wildlife Action Plan Team 2012

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Northern goshawk *Accipiter gentilis*	BLM	Range: Breeds in the northern two-thirds of Nevada, may winter throughout the state. Habitat: Occurs in open sagebrush adjacent to riparian aspen stands, and coniferous forest. Nests in large trees within dense large tracts of mature or old growth forest with high canopy closure. Breeding period is early April to August.	None.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Peregrine falcon *Falco peregrinus*	BLM	Range: Occurs throughout Nevada, nesting has only been confirmed in Clark, White Pine, and Lincoln counties. Habitat: Open areas including near open water, desert shrub, and marshes associated with suitable nesting cliffs, mountains, open forested regions, and urban areas. Nests on a ledge or hole on the face of a rocky cliff or crag. Breeding period is late February to July.	None.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Pinyon jay *Gymnorhinus cyanocephalus*	BLM	Range: Throughout Nevada, although more common in the central and southern portions of the state. Habitat: Piñon-juniper woodlands and less frequently in pine forests, scrub oak, and sagebrush. Nests in shrubs or trees about 5-30 feet off the ground. Breeding period is late March to August.	Low. Suitable nesting and foraging habitat is lacking within the study area.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Sage thrasher *Oreoscoptes montanus*	BLM	Range: Throughout Nevada, breeding range extends southward into the northern Mojave region. Habitat: Occurs in sagebrush, montane shrubland, and salt desert scrub. Nests on the ground in the fork of as shrub. Breeding period is April to late August.	Moderate. Suitable habitat is present; however, this species was not recorded during breeding bird surveys.	No. Suitable habitat occurs within the study area; however, no individuals were identified during baseline surveys.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Swainson's hawk *Buteo swainsoni*	BLM	Range: Throughout Nevada. Habitat: Riparian, agricultural, and sagebrush habitats. Nests in old, large trees with overhead cover or on cliff ledges. Breeding period is April to August.	Moderate. Suitable habitat is present; however, this species was not recorded during breeding bird surveys and no nests were observed during nest surveys within 10 miles of the study area.	No. Suitable breeding and summer foraging habitat occurs within the study area; no nests or individuals were identified during baseline surveys.	Great Basin Bird Observatory 2010
Western burrowing owl *Athene cunicularia hypugaea*	BLM	Range: Throughout Nevada. Habitat: Occurs in open grasslands, sagebrush, and sagebrush-steppe, often in open areas. Nests in abandoned burrows dug by mammals such as ground squirrels, badgers, or foxes. Breeding period is mid-April to early August.	Moderate. Although this species could potentially occupy the lower elevations of the study area, no burrowing owls were detected during breeding bird surveys conducted in the study area.	No. Suitable breeding/summer and early fall foraging/migration habitat occurs within the study area; no nests or individuals were identified during baseline surveys.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Western snowy plover *Charadrius nivosus*	BLM	Range: Migrates throughout Nevada, breeds in Churchill, Elko, Eureka, Humboldt, Lyon, Mineral, Nye, Pershing, Washoe, and White Pine counties. Habitat: Occurs in alkali playas near standing pools of shallow water and ephemeral wetlands. Nests in scrapes in the bare ground near water. Breeding period is late March to July.	Low. This species may migrate through the study area. Snowy plover was not observed during breeding bird surveys.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012, Great Basin Bird Observatory 2010
Reptiles					
Desert rosy boa *Lichanura trivirgata*	NV-SP	Range: Patchy distribution in extreme southern Nevada. Habitat: Occurs in arid and semi-arid scrublands, hillsides, rocky deserts, canyons, and other rock-strewn regions.	None.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Sierra alligator lizard *Elgaria coerulea palmeri*	NV-SP	Range: Sierra Nevada range and adjacent areas in the western portion of the state. Habitat: Occurs in cool, damp parts of forested habitats and montane chaparral.	None.	Yes. No suitable habitat occurs within the study area.	Wildlife Action Plan Team 2012
Amphibians					
Columbia spotted frog *Rana luteiventris*	BLM, NV-SP	Range: The Jarbidge, Independence, Ruby, and Toiyabe Mountains. Habitats: Occurs in clear, slow-moving, or ponded surface waters with little shade. Breeding and egg-laying occurs in waters with floating vegetation including oxbows, lakes, stock ponds, and beaver ponds.	High. Suitable habitat occurs in the study area within portions of Antelope Creek.	No.	Wildlife Action Plan Team 2012
Northern leopard frog *Lithobates pipiens*	BLM, NV-SP	Range: Throughout eastern and areas of northwestern Nevada. Habitat: Occurs in a variety of habitats including springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes with rooted vegetation. Eggs are laid in shallow, still, permanent water.	Low. Suitable habitat is marginal within the study area.	Yes. Marginal suitable habitat occurs within the study area; however, this species was not detected during baseline surveys.	Wildlife Action Plan Team 2012
Fish					
Inland Columbia Basin redband trout *Oncorhynchus mykiss gairdneri*	BLM	Range: Occurs in Elko county in the Long-Ruby Valleys watershed. Habitat: Occurs in a wide variety of habitats including lakes, rivers, and creeks. Riverine habitat includes cool flowing water with available cover of well-vegetated and stable stream banks.	None.	Yes. No suitable habitat occurs within the study area.	Behnke 1992
Lahontan cutthroat trout *Oncorhynchus clarki hanshawi*	FT, BLM	Range: Found in the Lahontan Basin of northern Nevada and eastern Oregon.	None.	Yes. No suitable habitat occurs within the study area.	USFWS 1994

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Invertebrates					
California floater *Anodonta californiensis*	BLM	Range: Widely distributed in the Humboldt River drainage (Lahontan Basin) in northern Nevada. Habitat: Found in both lakes and lake-like stream environments.	None.	Yes. No suitable habitat occurs within the study area.	NatureServe 2015
Plants					
Barren Valley collomia *Collomia renacta*	BLM	Range: Elko County. Habitat: Lightly disturbed, north-sloping rocky slopes near drainage bottoms.	Moderate. The project area is 500 feet below the known elevation range of the species.	Yes. No suitable habitat occurs within the study area.	SRK 2013b
Broad fleabane *Erigeron latus*	BLM	Range: Elko County. Habitat: Shallow, relatively barren, vernally saturated, otherwise dry, gravelly to sandy soils or bedrock on flats and slopes of volcanic scablands or benches.	Moderate. Suitable vegetation community and elevation range is present; however, surveys have not shown that this species is present. **Possibly extirpated.**	Yes.	NatureServe 2015, SRK 2013b
Deeth buckwheat *Eriogonum nutans* var. *glabratum*	BLM	Range: Habitat: Sandy flats and slopes.	Moderate. Suitable vegetation community and elevation range is present; however, surveys have not shown that this species is present. **Possibly extirpated.**	Yes.	NatureServe 2015, SRK 2013b
Elko rockcress *Boechera falcifructa*	BLM	Range: Elko County. Habitat: Dry, densely vegetated, relatively undisturbed, light colored silty soils with a high cover of mosses on moderate to steep north facing slopes.	Moderate. Suitable vegetation community and elevation range is present; however, most of the steep north facing slopes have been disturbed by livestock and no longer have suitable soil to support this species.	Yes.	SRK 2013b
Grimy mousetailes *Ivesia rhypara* var. *rhypara*	BLM	Range: Elko County. Habitat: Dry, relatively barren, yellowish, or light-colored outcrops or badlands of welded, on slopes with east to south to west aspects.	Moderate. Suitable vegetation community and elevation range is present; however, surveys have not shown that this species is present.	Yes.	SRK 2013b

Table D-1. Special-Status Species Identified for the Rossi Mine Project

Common Name *Scientific Name*	Status[1]	Range Habitat Requirements	Potential for Occurrence Within or Near the Study Area	Eliminated from Detailed Analysis	References
Least phacelia *Phacelia minuitissima*	BLM	Range: Elko and Eureka Counties. Habitat: Vernally saturated, summer drying, sparsely vegetated, partially shaded to fully exposed areas of bare soil and mud banks in meadows.	Moderate. Suitable vegetation community and elevation range is present; however, surveys have not shown that this species is present.	Yes.	SRK 2013b
Lewis buckwheat *Eriogonum lewisii*	BLM	Range: Elko and Eureka Counties. Habitat: Exposed rocky ridge, convex knolls and crests derived from limestone or other carbonate rock types with significant silt on flat to moderately steep slopes at all aspects.	Low. Suitable habitat is marginal within the study area.	Yes.	SRK 2013b
Meadow pussytoes *Antennaria arcuata*	BLM	Range: Elko County. Habitat: Bare, periodically disturbed ground in marginal, seasonally dry parts of moist, often hummocky alkaline meadows, seeps, and springs.	Moderate. Seasonally dry meadow habitats are present and the project area is in the elevation range of this species; however, surveys have not shown that this species is present.	Yes.	SRK 2013b
Obscure buttercup *Ranunculus triternatus*	BLM	Range: Elko County. Habitat: Vernally moist slopes of high hills.	Moderate. Suitable vegetation community and elevation range is present; however, surveys have not shown that this species is present. **Possibly extirpated.**	Yes.	NatureServe 2015, SRK 2013b
Owyhee prickly phlox *Leptodactylon glabrum*	BLM	Range: Elko, Humboldt, and Pershing Counties. Habitat: Crevices in steep to vertical, coarse crumbling volcanic canyon walls. Intolerant of water paths or seeps that may form in rock crevices.	Low. Suitable habitat is marginal within the study area.	Yes.	SRK 2013b

[1] Status:

BLM	BLM Sensitive Species
FT	Federally Threatened Species
NV-SP	Nevada State Protected
NV-SPS	Nevada State Protected Sensitive
NV-ST	Nevada State Threatened

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ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX E

WATER QUALITY DATA

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Table E-1. Surface Water, Lower Pond

Sample Location Lower Pond		2012			2013			2014					2015					2016
Description	Reference Value (mg/L)	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	1st Quarter Duplicate	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	4th Quarter Duplicate	1st Quarter
Lab: WETLab																		
Lab Reference #		1205340-004	1209335-002	1212189-002	1303302-005	1306061-005	1309258-006	1403351-001	1403351-002	1406437-002	1409827-006	1412516-005	1503619-002	1507002-003	1508530-006	1512497-005	1512497-006	10342736001
Sample Date		5/14/2012	9/17/2012	12/10/2012	3/13/2013	6/3/2013	9/10/2013	3/12/2014	3/12/2014	6/16/2014	9/26/2014	12/15/2014	3/19/2015	6/29/2015	8/18/2015	12/14/2015	12/14/2015	03/24/2016
Lab Test Date		5/17/12-5/22/12	9/19/12-9/28/12	12/11/12-12/21/12	3/15/13-3/22/13	6/5/13-6/19/13	9/13/13-9/25/13	3/14/14-3/28/14	3/14/14-3/28/14	6/17/14-6/25/14	9/30/14-10/8/14	12/18/14-12/30/14	3/23/15-3/27/15	7/1/15-7/10/15	8/21/15-8/28/15	12/17/15-12/29/15	12/17/15-12/29/15	4/30/16-4/8/16
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	K. Fallowfield
Bicarbonate (HCO_3)	—	77	110	100	70	75	160	110	110	170	160	200	140	38	100	150	150	156
Carbonate (CO_3)	—	<1.0	<1.0	<1.0	6	4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	11	<1.0	<1.0	<1.0	<5.0
Alkalinity, Total ($CaCO_3$)	—	63	91	82	68	69	130	88	89	140	160	200	140	49	100	150	150	159
Aluminum	0.2	<0.045	**0.26**	**0.31**	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	0.047	<0.045	<0.01
Antimony	0.006	0.0028	0.003	<0.0025	0.0026	0.0032	<0.0025	<0.0025	<0.0025	0.0028	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0005
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	0.0053	<0.0050	0.0065	0.0062	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.001
Barium	2	0.022	1.30	0.800	0.038	0.091	0.030	0.190	0.070	0.093	0.13	0.16	0.17	0.16	0.10	0.54	0.88	0.0476
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00008
Calcium	—	42	45	41	36	40	46	36	37	45	46	53	39	20	31	47	48	42
Chloride	400	45	33	31	26	30	22	26	26	21	18	20	25	33	26	21	22	14.9
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.001
Fluoride	4	1.1	1.2	0.88	0.85	10.95		0.65	0.65	0.38	1.4	1.2	0.98	1.7	1.4	0.82	0.76	0.66
Iron	0.6	<0.010	<0.010	0.150	<0.010	<0.010	0.025	<0.010	<0.010	0.021	0.29	0.16	0.015	<0.020	<0.020	0.037	0.076	<0.05
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0001
Magnesium	150	12	15	13	14	17	23	15	16	15	18	16	17	7.6	11	18	18	18.2
Manganese	0.1	0.012	0.020	0.012	0.026	<0.0050	0.030	<0.0050	<0.0050	0.043	0.024	0.0060	0.0072	0.0060	0.011	0.024	0.029	0.0377
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	<0.0002
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Nitrate + Nitrite, Total (as N)	10	4.1	1.8	5.1	2.4	0.4	0.9	3	3.1	0.67	0.38	3.9	10	<0.10	0.26	2.0	1.9	0.74
pH (standard units) [H]	6.5-8.5	7.35	7.70	7.50	**8.59**	**8.51**	8.13	7.70	7.86	8.25	8.19	8.15	8.10	**9.05**	7.86	7.85	8.06	8.34
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	6.2	8.8	5.9	5.4	6.7	6.7	6.8	6.8	9.0	9.9	6.3	6.7	5.1	6.4	5.3	5.8	4.53
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Sodium	—	23	34	25	17	23	28	21	22	58	53	46	36	33	30	30	32	25.7
Sulfate	500	82	110	74	82	95	100	70	70	120	110	62	49	53	63	69	67	55.8
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001

Table E-1. Surface Water, Lower Pond

Sample Location Lower Pond		2012			2013			2014					2015					2016
Description	**Reference Value (mg/L)**	***2nd Quarter***	***3rd Quarter***	***4th Quarter***	***1st Quarter***	***2nd Quarter***	***3rd Quarter***	***1st Quarter***	***1st Quarter Duplicate***	***2nd Quarter***	***3rd Quarter***	***4th Quarter***	***1st Quarter***	***2nd Quarter***	***3rd Quarter***	***4th Quarter***	***4th Quarter Duplicate***	***1st Quarter***
Total Dissolved Solids	1000	320	350	330	250	300	330	260	270	350	360	370	320	180	250	300	300	287
WAD Cyanide	0.2	<0.010	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Zinc	5.0	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005
Calculated Error (%)	—	3.9	<1.0	<1.0	2.3	3.3	1.3	1.5	<1.0	2.4	11.4	<1.0	2.0	1.4	2.7	<1.0	2.2	—

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-2. Surface Water, Stock Pond

Sample Location Stock Pond		2012			2013			2014					2015			2016
Description	Reference Value (mg/L)	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	2nd Quarter Duplicate	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter
Lab: WETLab																
Lab Reference #		1205340-002	1209335-003	1212189-003	1303302-001	1306061-004	1309258-005	1403351-004	1406437-003	1406437-004	1409827-009	1412516-009	1503619-007	1507002-005	1508530-003	10342736003
Sample Date		5/14/2012	9/17/2012	12/10/2012	3/13/2013	6/3/2013	9/10/2013	3/12/2014	6/16/2014	6/16/2014	9/26/2014	12/15/2014	3/19/2015	6/29/2015	8/18/2015	03/24/2016
Lab Test Date		5/17/12-5/22/12	9/19/12-9/28/12	12/11/12-12/21/12	3/15/13-3/22/13	6/5/13-6/19/13	9/13/13-9/25/13	3/17/14-3/28/14	6/17/14-6/25/14	6/17/14-6/25/14	9/30/14-10/8/14	12/17/14-12/30/14	3/23/15-3/27/15	7/1/15-7/10/15	8/21/15-8/28/15	4/30/16-4/8/16
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	K. Fallowfield
Bicarbonate (HCO_3)	—	<1.0	82	120	110	6.9	54	76	130	120	120	160	110	28	39	47.3
Carbonate (CO_3)	—	2	14	<1.0	2.8	20	14	13	18	19	3.6	<1.0	15	36	18	25.9
Alkalinity, Total ($CaCO_3$)	—	51	90	100	96	39	67	83	130	130	120	160	120	63	57	73.2
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	0.0101
Antimony	0.006	<0.0025	0.0053	0.0036	0.0035	0.0036	0.004	0.0038	0.0055	0.0053	0.0046	<0.0025	<0.0025	0.0029	0.0045	0.00065
Arsenic	0.01	0.0064	0.0082	0.009	<0.0050	0.0081	**0.013**	0.008	0.027	0.027	0.010	0.0075	<0.0050	0.0076	0.0099	0.0043
Barium	2	0.07	0.076	0.047	0.044	0.059	0.18	0.051	0.13	0.14	0.17	0.089	´0.082	0.17	0.081	0.107
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00008
Calcium		25	32	39	39	22	30	33	29	30	34	43	31	19	20	28
Chloride	400	50	27	39	35	36	37	33	21	21	21	38	35	32	27	22
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.0012
Fluoride	4	0.62	0.67	1.1	0.71	0.72	0.58	0.45	0.92	0.93	0.77	0.87	0.91	0.58	0.52	0.43
Iron	0.6	<0.010	0.014	0.013	0.040	<0.010	0.014	0.072	0.022	0.023	0.047	0.029	<0.010	<0.020	<0.020	<0 050
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0001
Magnesium	150	11	22	22	20	19	22	17	20	21	21	24	19	16	16	9.4
Manganese	0.1	<0.0050	<0.0050	<0.0050	0.0094	<0.0050	0.014	0.03	0.014	0.016	0.012	0.012	0.0075	<0.0050	<0.0050	0.00097
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0002
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Nitrate + Nitrite, Total (as N)	10	0.92	<0.10	0.40	1.10	0.11	<0.10	0.87	0.30	0.29	<0.060	1.5	4.7	<0.10	<0.10	2.0
pH (standard units) [P]	6.5-8.5	**9.72**	**8.66**	8.03	8.40	**9.46**	**8.88**	**8.86**	**8.93**	**8.95**	8.38	8.25	**8.69**	**9.46**	**9.13**	**9.08**
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	5.6	8.5	8.4	6.4	5.8	7.1	5.7	14	14	10	10	8.7	7.9	6.0	4.38
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Sodium		24	29	34	21	24	24	18	51	51	40	47	42	32	22	19.1
Sulfate	500	47	110	89	81	81	88	59	110	110	110	78	55	68	83	36.4
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001

Table E-2. Surface Water, Stock Pond

Sample Location Stock Pond		2012			2013			2014					2015			2016
Description	**Reference Value (mg/L)**	***2nd Quarter***	***3rd Quarter***	***4th Quarter***	***1st Quarter***	***2nd Quarter***	***3rd Quarter***	***1st Quarter***	***2nd Quarter***	***2nd Quarter Duplicate***	***3rd Quarter***	***4th Quarter***	***1st Quarter***	***2nd Quarter***	***3rd Quarter***	***1st Quarter***
Total Dissolved Solids	1000	250	340	340	290	240	290	140	350	350	310	360	300	200	230	226
WAD Cyanide	0.2	<0.010	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	—
Zinc	5	<0.010	<0.010	<0.010	0.028	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005
Calculated Error (%)	—	2.3	<1.0	4.3	<1.0	4.4	3.1	<1.0	<1.0	2.2	8.1	3.0	1.4	3.0	3.3	—

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-3. Surface Water, SP-001

Sample Location SP-001		2012			2013			2014		2015			2016
Description	Reference Value (mg/L)	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter
Lab: WETLab													
Lab Reference #		1205340-006	1209335-001	1212189-001	1303302-004	1306061-006	1309258-001	1406437-001	1409827-001	1503619-001	1507002-007	1508530-001	10342736001
Sample Date		5/14/2012	9/17/2012	12/10/2012	3/13/2013	6/3/2013	9/10/2013	6/16/2014	9/25/2014	3/19/2015	6/29/2015	8/18/2015	03/24/2016
Lab Test Date		5/17/12-5/22/12	9/19/12-9/28/12	12/11/12-12/21/12	3/15/13-3/22/13	6/5/13-6/19/13	9/13/13-9/25/13	6/17/14-6/25/14	9/30/14-10/10/14	3/23/15-3/27/15	7/1/15-7/10/15	8/21/15-8/28/15	4/30/16-4/8/16
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	K. Fallowfield
Bicarbonate (HCO_3)	—	210	210	220	120	230	230	240	200	190	190	180	186
Carbonate (CO_3)	—	<1.0	<1.0	<1.0	25	<1.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<5.0
Alkalinity, Total ($CaCO_3$)	—	170	170	180	140	190	190	200	200	190	190	180	186
Aluminum	0.2	0.049	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.01
Antimony	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0005
Arsenic	0.01	<0.0050	<0.0050	<0.0050	0.0054	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0044
Barium	2	0.11	0.11	0.12	0.13	0.13	0.14	0.15	0.14	0.13	0.15	0.14	0.136
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00008
Calcium	—	50	51	53	39	61	60	63	65	60	61	63	67.4
Chloride	400	23	26	26	26	26	26	28	28	29	30	30	28.1
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.001
Fluoride	4	0.41	0.32	0.33	0.43	0.21	0.35	0.37	0.27	0.21	0.21	0.29	0.29
Iron	0.6	0.036	<0.010	<0.010	0.510	0.085	0.030	<0.010	<0.010	<0.010	<0.020	<0.020	<0.05
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0001
Magnesium	150	12	11	12	10	14	14	15	16	15	14	14	14.7
Manganese	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.012	<0.0050	<0.0050	<0.0050	0.015	0.011	0.0034
Mercury	0.002	<0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0002
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Nitrate + Nitrite, Total (as N)	10	**10**	**11**	**12**	9.4	**11**	**13**	9.7	**13**	**12**	**14**	**14**	**15.6**
pH (standard units)[HT]	6.5-8.5	7.30	7.20	7.36	**8.97**	7.55	7.63	8.35	7.73	8.01	7.51	7.80	7.81
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	1.3	1.9	2.3	2.6	2	2.6	1.4	3.1	2.3	2.8	2.5	2.47
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.001
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Sodium	—	44	40	46	40	47	52	55	56	52	47	47	51.8
Sulfate	500	41	41	41	44	41	44	46	47	50	45	45	50.2
Thallium	0.002	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001
Total Dissolved Solids	1000	390	390	400	340	410	420	390	410	400	420	430	442
WAD Cyanide	0.2	<0.010	<0.010	<0.010	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	—
Zinc	5	<0.010	<0.010	<0.010	<0.010	0.023	<0.010	<0.010	<0.010	<0.010	0.026	<0.010	<0.005
Calculated Error (%)	—	2.2	5.4	3.2	5.6	1.1	<1.0	2.6	13.4	<1.0	2.2	<1.0	—

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-4. Surface Water, SP-002

Sample Location SP-002		2012			2013			2014				2015			2016
Description	Reference Value (mg/L)	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter
Lab: WETLab															
Lab Reference#		1205340-003	1209335-004	1212189-005	1303302-003	1306061-003	1309258-002	1403351-003	1406437-005	1409827-008	1412516-001	1503619-008	1507002-006	1508530-002	10342736002
Sample Date		5/14/2012	9/17/2012	12/10/2012	3/13/2013	6/3/2013	9/10/2013	3/12/2014	6/16/2014	9/26/2014	12/15/2014	3/19/2015	6/29/2015	8/18/2015	03/24/2016
Lab Test Date		5/17/12-5/22/12	9/19/12-9/28/12	12/11/12-12/21/12	3/15/13-3/22/13	6/5/13-6/19/13	9/13/13-9/25/13	3/17/14-3/28/14	6/17/14-6/25/14	9/30/14-10/8/14	12/17/14-12/30/14	3/23/15-3/27/15	7/1/15-7/10/15	8/21/15-8/28/15	4/30/16-4/8/16
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	K. Fallowfield
Bicarbonate (HCO_3)	—	78	75	72	66	75	76	45	60	51	51	55	40	44	35.5
Carbonate (CO_3)	—	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Alkalinity, Total ($CaCO_3$)	—	64	61	59	56	61	63	37	49	51	51	55	40	44	35.5
Aluminum	0.2	0.096	<0.045	<0.045	0.048	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.010
Antimony	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0005
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0077	<0.0050	<0.0050	0.0054	<0.0050	<0.0050	<0.0050	0.0045
Barium	2	0.22	0.25	0.23	0.21	0.25	0.24	0.18	0.21	0.22	0.19	0.22	0.22	0.20	0.157
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00008
Calcium		43	45	45	42	49	47	39	43	48	42	44	42	40	37.9
Chloride	400	41	42	41	45	45	38	48	42	46	47	46	42	40	36.8
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.0013
Fluoride	4	0.54	0.44	0.44	0.44	<0.10	0.46	0.35	0.48	0.38	0.49	0.55	0.37	0.42	0.49
Iron	0.6	0.032	<0.010	0.043	0.066	<0.010	0.020	0.022	<0.010	<0.010	0.013	<0.010	<0.020	<0.020	<0.050
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0001
Magnesium	150	11	12	11	11	13	12	9.7	11	12	10	12	10	9.6	8.92
Manganese	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0021
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0002
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Nitrate + Nitrite, Total (as N)	10	**22**	**26**	**25**	**22**	**22**	**29**	**14**	**19**	**26**	**24**	**23**	**21**	**22**	**16.1**
pH (standard units) [HT]	6.5-85	7.37	7.32	7.47	8.35	7.91	7.62	7.56	7.71	7.53	7.88	7.92	7.52	7.66	8.41
Phosphorus	—	—	—	—	—	—	—	—	_	—		_	_	n.m.	—
Potassium	—	3.0	3.6	3.6	3.3	3.6	3.8	3.2	3.4	3.7	3.0	3.4	3.3	3.0	2.64
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00099
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Sodium	—	32	32	33	29	36	37	28	34	35	31	36	31	29	27.1
Sulfate	500	34	35	37	31	34	36	34	37	37	37	36	38	38	47.1
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001

Table E-4. Surface Water, SP-002

Sample Location SP-002		2012			2013			2014				2015			2016
Description	Reference Value (mg/L)	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter
Total Dissolved Solids	1000	350	370	400	360	400	430	320	330	370	380	370	340	350	296
WAD Cyanide	0.2	<0.010	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Zinc	5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005
Calculated Error (%)	—	2.3	3.1	2.5	3.1	4.0	1.2	2.9	3.3	3.8	5.6	<1.0	<1.0	3.2	—

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

"F" Sample was analyzed beyond the accepted holding time.

Table E-5. Ground Water, MW-1

Sample Location MW-1		2013				2014							2015		2016
Description	**Reference Value (mg/L)**	***September***	***October***	***November***	***December***	***January***	***February***	***March***	***April***	***May***	***September***	***December***	***3rd Quarter***	***4th Quarter***	***1st Quarter***
Certified Lab: WETLab															
Lab Reference #		1309258-010	1310357-009	1311201-008	1312202-006	1401251-006	1402536-004	1403353-003	1404324-005	1405492-007	1409827-011	1412516-008	1507663-002	1512497-002	10342740003
Sample Date		9/10/2013	10/6/2013	11/11/2013	12/9/2013	1/13/2014	2/26/2014	3/12/2014	4/10/2014	5/20/2014	9/26/2014	12/15/2014	7/22/2015	12/14/2015	03/23/2016
Lab Test Date		9/13/13-9/25/13	10/18/13-10/30/13	11/13/13-11/21/13	12/11/13-12/23/13	1/15/14-1/22/14	2/28/14-3/13/14	3/14/14-3/28/14	4/11/14-4/22/14	5/22/14-6/2/14	9/30/14-10/8/14	12/18/14-12/30/14	7/24/15-8/4/15	12/17/15-12/29/15	03/30/16-04/08/16
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	K. Fallowfield
Bicarbonate (HCO_3)	—	290	260	210	240	250	140	240	240	240	200	200	210	200	203
Carbonate (CO_3)	—	<1.0	<1.0	013	<1.0	<1.0	25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Alkalinity, Total ($CaCO_3$)	—	240	210	200	200	200	160	190	190	190	200	200	210	200	203
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	0.047	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.010
Antimony	0.006	0.0045	**0.022**	<0.0025	<0.0025	0.0041	<0.0025	0.0033	0.0038	0.0049	**0.012**	0.0041	0.0027	<0.0025	0.0011
Arsenic	0.01	<0.0050	**0.020**	<0.0050	<0.0050	0.0089	<0.0050	0.0074	0.0051	0.0089	<0.0050	0.010	0.0094	0.0078	0.0057
Barium	2	0.059	0.052	0.078	0.083	0.1	0.42	0.16	0.23	0.12	0.099	0.11	0.058	0.063	0.0559
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.00008
Calcium	–	40	45	028	34	41	11	36	28	35	40	38	45	43	44.8
Chloride	400	16	17	16	16	17	17	16	17	17	17	17	17	16	17
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.001
Fluoride	4	0.62	0.56	0.43	0.43	0.47	0.42	0.51	0.54	0.65	0.54	0.61	0.50	0.68	0.6
Iron	0.6	0.3	<0.050	<0.010	<0.050	0.21	0.12	0.038	**1.0**	0.014	0.40	0.052	<0.020	0.023	<0.050
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0001
Magnesium	150	22	25	22	24	25	21	22	21	23	23	23	25	26	25.1
Manganese	0.1	0.08	**0.12**	0.034	0.087	**0.12**	0.0057	0.091	0.07	0.10	**0.13**	**0.12**	**0.11**	**0.11**	**0.111**
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.0002
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Nitrate + Nitrite, Total (as N)	10	0.13	<0.10	0.53	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.26	<0.050	<0.10	<0.10	<0.1
pH (standard units)[HT]	6.5-8.5	8.26	7.87	**8.61**	7.71	7.8	**9.08**	7.8	7.88	7.81	7.89	7.94	8.29	7.74	7.84
Phosphorus	—	—	—	—	—		—	—	—	—	—	—	—	—	—
Potassium	—	5.6	5.6	5.2	5.6	5.3	5.6	5	4.9	5.4	5.7	5.0	5.2	5.1	4.86
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Sodium	—	36	28	031	28	27	30	23	25	24	28	27	27	24	24.6
Sulfate	500	31	35	9.9	21	31	<1.0	27	29	31	33	29	33	33	35.1
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001
Total Dissolved Solids	1000	300	330	220	240	270	170	250	270	240	250	260	240	280	441
WAD Cyanide	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	—
Zinc	5.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.005
Calculated Error (%)	—	3.1	1.5	001	1.9	1.7	1.4	2.4	6.9	2.7	15.0	<1.0	2.0	2.8	—

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-6. Ground Water, MW-2

Sample Location MW-2		2013				2014						
Description	**Reference Value (mg/L)**	***September***	***October***	***November***	***December***	***January***	***February***	***March***	***April***	***May***	***September***	***December***
Certified Lab: WETLab												
Lab Reference #		1309258-009*	1310357-010	1311201-010	1312202-007	1401251-005	1402536-005	1403353-004	1404324-007	1405492-008	1409827-012	1412516-010
Sample Date		9/10/2013	10/16/2013	11/11/2013	12/9/2013	1/13/2014	2/26/2014	3/12/2014	4/10/2014	5/20/2014	9/26/2014	12/15/2014
Lab Test Date		9/13/13-9/26/13	10/18/13-10/30/13	11/13/13-11/21/13	12/11/13-12/19/13	1/15/14-1/22/14	2/28/14-13/14	3/14/14-3/28/14	4/11/14-4/22/14	5/22/14-6/2/14	9/30/14-10/8/14	12/18/14-12/30/14
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner
Bicarbonate ($HC0_3$)	—	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	63	32
Carbonate ($C0_3$)	—	48	130	12	110	59	27	41	49	89	92	37
Alkalinity, Total ($CaC0_3$)	—	1200	920	500	500	380	280	270	220	240	160	69
Aluminum	0.2	0.069	0.16	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045
Antimony	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0037	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Barium	2	**3.2**	2	1.4	1.1	0.86	0.65	0.59	0.54	0.47	0.23	0.10
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Calcium	—	350	310	200	170	140	110	100	77	71	27	9.8
Chloride	400	24	24	24	23	26	25	23	17	25	25	24
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoride	4	<1.0	<1.0	<1.0	<1.0	0.45	0.47	<1.0	0.52	0.55	0.49	0.55
Iron	0.6	<0.010	0.24	0.046	<0.010	0.016	<0.010	<0.050	0.032	<0.010	<0.010	0.014
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	150	<0.50	3.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.9	2.4
Manganese	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate + Nitrite, Total (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.060	<0.050
pH (standard units) [HT]	6.5-8.5	**12.25**	**12.03**	**11.83**	**11.91**	**11.75**	**11.71**	**11.58**	**11.46**	**11.41**	**10.61**	**10.10**
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	17	13	12	12	9.8	19	8.8	7.1	8.4	7.5	7.3
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Silver	0.1	0.0072	0.0055	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	—	54	41	44	45	40	34	34	32	36	36	36
Sulfate	500	26	27	22	21	32	28	30	28	36	39	38
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Dissolved Solids	1000	**1200**	800	630	540	470	380	360	350	270	160	130
WAD Cyanide	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010
Zinc	5.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Calculated Error (%)	—	9.6	4.8	5.4	2.2	<1.0	3.7	<1.0	<1.0	9.1	13.0	8.3

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

* Sample was reanalyzed as first results yielded an error over 15%.

Table E-7. Ground Water, MW-2R

Sample Location MW-2R		2015		2016	
Description	**Reference Value (mg/L)**	***3rd Quarter***	***4th Quarter***	***1st Quarter***	***1st Quarter Duplicate***
Certified Lab: WETLab					
Lab Reference #		1507663-001	1512497-001	10342740003	10342740004
Sample Date		7/22/2015	12/14/2015	03/23/2016	3/23/2016
Lab Test Date		7/24/15-8/4/15	12/17/15-12/29/15	03/30/16-4/08/16	03/30/16-4/08/16
Sampled By		H. Gloeckner	H. Gloeckner	K. Fallowfield	K. Fallowfield
Bicarbonate ($HC0_3$)	—	190	190	189	188
Carbonate ($C0_3$)	—	<1.0	<1.0	<5.0	<5.0
Alkalinity, Total ($CaC0_3$)	—	190	190	189	188
Aluminum	0.2	<0.045	<0.045	<0.010	<0.010
Antimony	0.006	<0.0025	<0.0025	<0.0005	<0.0005
Arsenic	0.01	0.0074	0.0067	0.0066	0.0067
Barium	2	0.13	0.14	0.12	0.123
Beryllium	0.004	<0.0010	<0.0010	<0.0002	<0.0002
Cadmium	0.005	<0.0010	0.0011	<0.00008	<0.00008
Calcium	—	66	67	66	66.2
Chloride	400	49	45	46.1	45.9
Chromium	0.1	<0.0050	<0.0050	<0.0005	<0.0005
Copper	1	<0.050	<0.050	<0.001	<0.001
Fluoride	4	0.31	0.58	0.48	0.47
Iron	0.6	<0.020	<0.020	<0.050	<0.050
Lead	0.015	<0.0025	<0.0025	<0.0001	<0.0001
Magnesium	150	17	17	15.6	16.0
Manganese	0.1	<0.0050	<0.0050	<0.0005	<0.0005
Mercury	0.002	<0.00010	<0.00010	<0.0002	<0.0002
Nickel	0.1	<0.010	<0.010	n.m.	—
Nitrate + Nitrite, Total (as N)	10	0.63	0.56	0.53	0.52
pH (standard units) [HT]	6.5-8.5	8.19	7.79	7.44	—
Phosphorus	—	—	—	—	—
Potassium	—	6.3	6.8	6.37	6.47
Selenium	0.05	<0.0050	<0.0050	<0.0005	<0.0005
Silver	0.1	<0.0050	<0.0050	<0.0005	<0.0005
Sodium	—	51	48	53.4	53.6
Sulfate	500	85	81	85.8	85.4
Thallium	0.002	<0.0010	<0.0010	<0.0001	<0.0001
Total Dissolved Solids	1000	410	400	279	459
WAD Cyanide	0.2	<0.010	<0.010	n.m.	—
Zinc	5.0	<0.010	<0.010	<0.005	<0.005
Calculated Error (%)	—	<1.0	1.3	—	—

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-8. Ground Water, MW-3

Sample Location MW-3		2013				2014						
Description	**Reference Value (mg/L)**	***September***	***October***	***November***	***December***	***January***	***February***	***March***	***April***	***May***	***September***	***December***
Certified Lab: WETLab												
Lab Reference #		1309258-011	1310357-008	1311201-009	1312202-008	1401251-004	1402536-003	1403353-005	1404324-008	1405492-009	1409827-013	1412516-011
Sample Date		9/10/2013	10/16/2013	11/11/2013	12/9/2013	1/13/2014	2/26/2014	3/12/2014	4/10/2014	5/20/2014	9/26/2014	12/15/2014
Lab Test Date		9/13/13-9/25/13	10/18/13-10/30/13	11/13/13-11/21/13	12/11/13-12/19/13	1/15/14-1/22/14	2/28/14-3/12/14	3/14/14-3/28/14	4/11/14-4/22/14	5/22/14-6/2/14	9/30/14-10/8/14	12/18/14-12/30/14
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner
Bicarbonate ($HC0_3$)	—	830	440	270	120	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbonate ($C0_3$)	—	530	540	590	600	600	540	530	520	360	480	380
Alkalinity, Total ($CaC0_3$)	—	1600	1300	1200	1100	1100	1000	1100	1000	800	890	900
Aluminum	0.2	**0.79**	**1.4**	**0.48**	**1**	**1.2**	**1.4**	**1.2**	**1.3**	**1.4**	**0.90**	**1.0**
Antimony	0.006	<0.0025	**0.0063**	**0.0066**	0.0058	0.0048	0.0036	0.0031	0.003	0.0025	<0.0025	0.0028
Arsenic	0.01	**0.022**	**0.03**	**0.024**	**0.032**	**0.024**	**0.023**	**0.023**	**0.013**	**0.015**	**0.012**	0.0099
Barium	2	0.77	1.1	0.82	0.91	0.82	0.79	0.86	0.9	0.75	0.73	0.62
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Calcium	—	190	240	240	240	240	260	240	240	240	240	220
Chloride	400	310	**520**	**540**	**580**	**630**	**500**	**510**	240	**500**	**400**	340
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoride	4	<1.0	<1.0	<1.0	<1.0	<1.0	1.3	2.1	<1.0	1.2	1.1	<2.0
Iron	0.6	**5.3**	**6.4**	**2.9**	**2.5**	1.7	**1.2**	**0.80**	**0.85**	**0.69**	**0.60**	0.53
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	150	1.2	3.3	0.56	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Manganese	0.1	0.058	**0.12**	<0.0050	0.037	0.025	0.01	<0.0050	0.0077	<0.0050	<0.0050	<0.0050
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	0.00010
Nickel	0.1	<0.010	<0.010	0.013	<0.010	0.012	<0.010	0.013	<0.010	<0.010	0.013	<0.010
Nitrate + Nitrite, Total (as N)	10	0.17	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.060	<0.050
pH (standard units) [HT]	6.5-8.5	**11.46**	**11.48**	**11.62**	**11.82**	**11.83**	**11.96**	**11.92**	**11.84**	**11.91**	**11.86**	**12.03**
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	13	20	19	27	21	24	30	20	38	30	26
Selenium	0.05	<0.0050	0.02	0.017	0.024	0.024	0.031	0.031	0.014	0.021	0.026	0.017
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0051	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	—	840	720	750	780	600	640	530	450	490	540	360
Sulfate	500	87	68	55	48	54	37	42	25	41	28	23
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Dissolved Solids	1000	**3800**	**3500**	**3300**	**3100**	**2800**	**2700**	**2500**	**2400**	**2200**	**1800**	**1600**
WAD Cyanide	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010
Zinc	5.0	<0.010	<0.010	0.026	0.014	0.027	0.031	0.015	0.033	0.033	0.030	0.019
Calculated Error (%)	—	5.6	3.8	5.7	8.7	2.1	7.6	1.5	7.9	5.3	10.0	1 2

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-9. Ground Water, MW-4

Sample Location MW-4		2013				2014								2015		2016
Description	**Reference Value (mg/L)**	***September***	***October***	***November***	***December***	***January***	***January Duplicate***	***February***	***March***	***April***	***May***	***September***	***December***	***3rd Quarter***	***4th Quarter***	***1st Quarter***
Certified Lab: WETLab																
Lab Reference#		1309258-013	1310357-001	1311201-004	1312202-002	1401251-002	1401251-003	1402536-002	1403353-002	1404324-002	1405492-002	1409827-003	1412516-003	1507663-003	1512497-007	10342740001
Sample Date		9/10/2013	10/15/2013	11/11/2013	12/9/2013	1/13/2014	1/13/2014	2/26/2014	3/12/2014	4/10/2014	5/20/2014	9/25/2014	12/15/2014	7/23/2015	12/14/2015	03/23/2016
Lab Test Date		9/13/13-9/25/13	10/18/13-10/28/13	11/13/13-11/21/13	12/11/13-12/19/13	1/15/14-1/22/14	1/15/14-1/22/14	2/28/14-3/14/14	3/14/14-3/28/14	4/11/14-4/22/14	5/22/14-6/2/14	9/30/14-10/8/14	12/17/14-12/30/14	7/24/15-8/5/15	12/17/15-12/29/15	03/30/16-04/08/16
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	K. Fallowfield
Bicarbonate ($HC0_3$)	—	250	220	220	230	230	230	230	230	230	230	190	190	200	190	193
Carbonate ($C0_3$)	—	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
Alkalinity, Total ($CaC0_3$)	—	200	180	180	190	190	190	190	190	190	190	190	190	200	190	193
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.010
Antimony	0.006	**0.006**	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0005
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Barium	2	0.058	0.046	0.036	0.039	0.037	0.035	0.036	0.034	0.031	0.023	0.028	0.028	0.023	0.018	0.0202
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0002
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00008
Calcium	—	41	45	42	45	46	44	45	46	42	41	46	45	47	43	49.2
Chloride	400	36	27	17	15	15	15	14	14	14	14	14	14	13	14	14.1
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.001
Fluoride	4	1.0	0.83	0.63	0.73	0.88	0.81	0.76	0.74	0.82	0.98	0.85	0.88	0.80	0.93	0.93
Iron	0.6	**0.68**	<0.010	0.23	0.017	0.30	0.29	**0.81**	0.13	0.32	0.052	0.34	0.18	0.49	0.17	<0.050
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0001
Magnesium	150	16	22	22	22	23	22	23	22	23	23	24	24	24	24	26.7
Manganese	0.1	**0.17**	**0.28**	**0.22**	**0.2**	**0.22**	**0.21**	**0.21**	**0.17**	**0.18**	**0.19**	**0.16**	**0.15**	**0.14**	**0.17**	**0.167**
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0002
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	n.m.
Nitrate + Nitrite, Total (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.060	<0.050	0.39	<0.10	<0.1
pH (standard units) [HT]	6.5-8.5	8.27	7.58	7.58	7.43	7.60	7.58	7.54	7.61	7.64	7.73	7.70	7.62	8.21	7.42	7.80
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	4.8	4.9	4.0	4.0	3.7	3.5	3.5	3.3	3.0	3.4	3.4	3.4	3.0	3.6	2.92
Selenium	0.05	0.015	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0005
Sodium	—	57	33	30	31	28	28	30	26	26	28	28	29	30	29	29.3
Sulfate	500	63	62	54	53	57	57	55	56	57	54	51	50	52	50	52.7
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0001

Table E-9. Ground Water, MW-4

Sample Location MW-4		2013				2014								2015		2016
Description	Reference Value (mg/L)	*September*	*October*	*November*	*December*	*January*	*January Duplicate*	*February*	*March*	*April*	*May*	*September*	*December*	*3rd Quarter*	*4th Quarter*	*1st Quarter*
Total Dissolved Solids	1000	370	320 HT	290	290	300	300	280	280	290	270	250	290	250	270	454
WAD Cyanide	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Zinc	5.0	<0.010	<0.010	<0.010	<0.010	0.075	0.052	<0.010	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005
Calculated Error (%)	—	3.8	<1.0	<1.0	1.7	<1.0	<1.0	2.1	<1.0	1.6	<1.0	16.0	2.8	1.9	1.9	

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

"T" Sample was analyzed beyond the accepted holding time.

Table E-10. Ground Water, PW-1 (42932)

Sample Location Well #42932		2013						2014						2015				
Description	**Reference Value (mg/L)**	***July***	***September***	***October***	***November***	***December***	***December Duplicate***	***April***	***May***	***May Duplicate***	***September***	***September Duplicate***	***December***	***1st Quarter***	***2nd Quarter***	***2nd Quarter Duplicate***	***3rd Quarter***	***4th Quarter***
Certified Lab: WETLab																		
Lab Reference #		1307228-001	1309258-007	1310357-004	1311201-006	1312202-003	1312202-004	1404324-003	1405492-003	1405492-004	1409827-004	1409827-005	14125016-004	1503619-003	1507002-001	1507002-002	1508530-007	1512497-004
Sample Date		7/10/2013	9/10/2013	10/15/2013	11/11/2013	12/9/2013	12/9/2013	4/10/2014	5/20/2014	5/20/2014	9/26/2014	9/26/2014	12/15/2014	3/19/2015	6/29/2015	6/29/2015	8/18/2015	12/14/2015
Lab Test Date		7/11/2013	9/13/13-9/25/13	10/18/13-10/29/13	11/13/13-11/21/13	12/11/13-12/19/13	12/11/13-12/19/13	4/11/14-4/22/14	5/22/14-6/2/14	5/22/14-6/2/14	9/30/14-10/8/14	9/30/14-10/8/14	12/17/14-12/30/14	3/23/15-3/27/15	7/1/15-7/10/15	7/1/15-7/10/15	8/21/15-8/28/15	12/17/15-12/29/15
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner
Bicarbonate (HCO_3)	—	320	330	330	330	330	330	330	320	320	270	270	270	260	260	260	270	270
Carbonate (CO_3)	—	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total ($CaC0_3$)	—	270	270	270	270	270	270	270	260	270	270	270	270	260	260	260	270	270
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045
Antimony	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0028	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Barium	2	0.036	0.037	0.035	0.032	0.036	0.034	0.033	0.033	0.036	0.041	0.036	0.037	0.040	0.040	0.038	0.039	0.046
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012
Calcium	—	54	51	52	047	50	48	48	50	56	57	51	51	51	52	51	47	53
Chloride	400	14	12	13	013	13	12	13	13	13	13	13	13	13	12	12	12	13
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoride	4	0.48	0.51	0.45	0.35	0.34	0.33	0.44	0.51	0.51	0.38	0.38	0.46	0.31	0.33	0.35	0.34	0.52
Iron	0.6	**0.76**	0.037	0.029	0.11	0.19	0.014	<0.050	0.024	0.017	0.021	0.025	0.046	0.022	<0.020	0.032	0.073	0.026
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	150	41	41	39	039	39	37	38	41	46	40	39	40	42	39	38	35	40
Manganese	0.1	**0.11**	**0.12**	**0.11**	**0.13**	**0.12**	**0.11**	**0.13**	**0.11**	**0.12**	0.087	0.085	0.099	0.093	0.080	0.084	0.080	0.095
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	0.00013	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate + Nitrite, Total (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.060	<0.060	<0.050	<0.050	<0.10	<0.10	<0.10	<0.10
pH (standard units') [HT]	6.5-8.5	7.48	7.67	7.68	7.64	7.53	7.54	7.83	7.76	7.72	7.80	7.78	7.77	7.55	7.82	7.78	7.78	7.79
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	5.6	5.5	5.3	5.4	5.8	5.7	4.8	5.9	6.4	6.1	6.0	5.2	5.0	4.9	4.8	5.0	5.2
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	—	28	30	29	028	30	30	26	30	33	31	31	29	29	27	27	26	26
Sulfate	500	84	65	68	065	60	60	69	65	65	65	65	61	63	62	61	61	61
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table E-10. Ground Water, PW-1 (42932)

Sample Location Well #42932		2013						2014						2015				
Description	Reference Value (mg/L)	July	September	October	November	December	December Duplicate	April	May	May Duplicate	September	September Duplicate	December	1st Quarter	2nd Quarter	2nd Quarter Duplicate	3rd Quarter	4th Quarter
Total Dissolved Solids	1000	380	360	480	380	370	360	360	340	340	350	340	350	350	360	360	340	360
WAD Cyanide	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	5.0	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Calculated Error (%)	—	<1.0	1.7	<1.0	1.6	<1.0	<1.0	3.2	2.4	7.9	17.5	15.0	1.3	3.5	1.9	1.1	3.9	1.0

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[T] Sample was analyzed beyond the accepted holding time.

Table E-11. Ground Water, PW-3 (61410)

Sample Location Well #61410		2012		2013					2014					2015				
Description	**Reference Value (mg/L)**	***April***	***September***	***June***	***September***	***October***	***November***	***December***	***April***	***May***	***September***	***December***	***December Duplicate***	***1st Quarter***	***1st Quarter Duplicate***	***2nd Quarter***	***3rd Quarter***	***3rd Quarter Duplicate***
Certified Lab: WETLab																		
Lab Reference #		1204512-001	1209335-005	1306061-001	1309258-003	1310357-005	1311201-007	1312202-005	1404324-006	1405492-006	1407927-010	1412516-006	1412516-007	1503619-005	1503619-006	1507002-004	1508530-004	1508530-005
Sample Date		4/26/2012	9/17/2012	6/3/2013	9/10/2013	10/15/2013	11/11/2013	12/9/2013	4/10/2014	5/20/2014	9/26/2014	12/15/2014	12/15/2014	3/19/2015	3/19/2015	6/29/2015	8/18/2015	8/18/2015
Lab Test Date		4/27/12-5/9/12	9/19/12-10/9/12	6/5/13-6/17/13	9/13/13-25/13	10/18/13-10/30/13	11/13/13-11/21/13	12/11/13-12/23/13	4/11/14-4/22/14	5/22/14-6/2/14	9/30/14-10/8/14	12/18/14-12/30/14	12/18/14-12/30/14	3/23/15-3/27/15	3/23/15-3/27/15	7/1/15-7/10/15	8/21/15-8/28/15	8/21/15-8/28/15
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner	H. Gloeckner
Bicarbonate (HCO_3)	—	120	120	120	120	120	120	120	120	120	100	100	100	100	100	99	100	100
Carbonate (CO_3)	—	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total ($CaCO_3$)	—	100	99	100	100	100	100	97	100	100	100	100	100	100	100	99	100	100
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045
Antimony	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	0.01	<0.0050	<0.0050	0.0054	<0.0050	0.0059	0.0059	<0.0050	<0.0050	0.0056	<0.0050	0.0064	0.0062	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Barium	2	0.15	0.16	0.16	0.16	0.15	0.15	0.15	0.16	0.14	0.15	0.15	0.16	0.16	0.16	0.15	0.15	0.14
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Calcium	—	27	27	30	28	30	29	28	29	27	28	30	30	29	29	28	28	28
Chloride	400	24	25	24	24	24	24	23	25	25	25	25	25	25	26	24	25	25
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoride	4	0.46	0.39	0.32	0.43	0.38	0.28	0.26	0.35	0.44	0.38	0.43	0.43	0.33	0.33	0.31	0.33	0.31
Iron	0.6	<0.010	<0.010	<0.010	0.023	<0.010	0.028	<0.010	0.046	0.036	0.099	0.040	0.064	<0.050	0.015	<0.020	<0.020	<0.020
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	150	7.2	7.3	8.3	7.6	7.6	7.6	7.1	7.7	7.3	7.1	7.6	7.6	7.6	7.8	7.2	7.0	7.1
Manganese	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0002	<0.00010
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate + Nitrite, Total (as N)	10	1.8	1.6	1.6	1.6	1.1	1.5	1.6	1.5	1.7	1.7	1.6	1.6	1.7	1.6	1.5	1.6	1.6
pH (standard units)	6.5-8.5	7.41	7.29	7.45	7.71	7.42	7.52	7.5	7.65	7.58	7.57	7.67	7.72	7.32	7.38	7.71	7.68	7.64
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	6.9	7.2	7.6	7.5	7.6	7.2	7.8	6.8	7.5	7.4	7.1	7.3	7.2	7.2	6.6	6.9	6.9
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	—	25	24	28	29	28	28	28	26	26	27	27	27	30	29	26	24	24
Sulfate	500	23	24	22	24	23	21	20	23	24	24	23	23	23	23	22	23	23
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table E-11. Ground Water, PW-3 (61410)

Sample Location Well #61410		2012		2013					2014					2015				
Description	Reference Value (mg/L)	*April*	*September*	*June*	*September*	*October*	*November*	*December*	*April*	*May*	*September*	*December*	*December Duplicate*	*1st Quarter*	*1st Quarter Duplicate*	*2nd Quarter*	*3rd Quarter*	*3rd Quarter Duplicate*
Total Dissolved Solids	1000	200	230	240	240	250 HT	250	240	260	230	230	240	260	230	230	240	260	240
WAD Cyanide	0.2	<0.010	<0.010	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	5.0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Calculated Error (%)	—	1.1	2.0	5.3	2.9	4.6	4.1	3.6	1.7	<1.0	10.9	2.4	2.5	3.5	2.8	<1.0	1.9	1.7

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

HT Sample was analyzed beyond the accepted holding time.

Table E-12. Ground Water, PW-4 (70710)

Sample Location Well #70710		2013					2014							2015	
Description	**Reference Value (mg/L)**	***September***	***October***	***November***	***November Duplicate***	***December***	***January***	***February***	***March***	***April***	***May***	***September***	***December***	***3rd Quarter***	***4th Quarter***
Certified Lab: WETLab															
Lab Reference #		1309258-012	1310357-007	1311201-002	1311201-003	1312202-001	1401251-001	1402536-001	1403353-001	1404324-001	1405492-001	1409827-002	1412516-002	1507781-001	1512497-003
Sample Date		9/10/2013	10/16/2013	11/11/2013	11/11/2013	12/9/2013	1/13/2014	2/26/2014	3/12/2014	4/10/2014	5/20/2014	9/25/2014	12/15/2014	7/29/2015	12/14/2015
Lab Test Date		9/13/13-9/25/13	10/18/13-10/30/13	11/13/13-11/21/13	11/13/13-11/21/13	12/11/13-12/23/13	1/15/14-1/22/14	2/28/14-3/12/14	3/14/14-3/28/14	4/11/14-4/22/14	5/22/14-6/2/14	9/30/14-10/8/14	12/18/14-12/30/14	7/30/15-8/13/15	12/17/15-12/29/15
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner	H. Gloeckner	H. Gloeckner
Bicarbonate ($HC0_3$)	—	<1.0	180	120	190	150	190	110	240	230	5.1	180	200	240	230
Carbonate ($C0_3$)	—	9.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.4	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total ($CaC0_3$)	—	27	150	96	150	120	160	90	190	190	8.1	180	200	240	230
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045
Antimony	0.006	<0.0025	<0.0025	0.0032	0.0030	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0026	<0.0025	<0.0025	<0.0025
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Barium	2	0.068	0.056	0.054	0.061	0.06	0.061	0.063	0.063	0.066	0.059	0.074	0.063	0.056	0.059
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Calcium	—	49	47	34	46	47	49	42	51	46	34	49	50	55	54
Chloride	400	15	15	14	14	14	14	15	14	14	15	15	14	15	14
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoride	4	1.2	0.91	0.78	0.70	0.90	0.88	0.93	0.76	0.87	1.2	0.93	0.92	0.90	1.0
Iron	0.6	0.030	<0.010	0.021	<0.010	0.021	<0.010	<0.010	0.12	0.16	0.026	0.45	**0.63**	<0.020	0.033
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	150	<0.50	16	3	19	19	18	9	24	19	2.1	22	23	29	29
Manganese	0.1	<0.0050	**0.11**	<0.0050	**0.12**	**0.12**	**0.11**	0.051	**0.14**	**0.13**	<0.0050	**0.21**	**0.14**	**0.15**	**0.16**
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate + Nitrite, Total (as N)	10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.18	<0.050	<0.10	<0.10
pH (standard units) [HT]	6.5-8.5	**9.94**	7.82	7.96	7.86	7.71	7.68	7.76	7.79	7.73	**8.83**	7.69	7.82	8.30	7.95
Phosphorus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium	—	26	13	22	11	12	12	18	7.6	10	26	10	8.4	5.2	5.1
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	—	39	30	34	31	35	33	34	27	30	37	31	30	30	26
Sulfate	500	160	120	120	88	100	85	130	71	79	160	80	64	50	51
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table E-12. **Ground Water, PW-4 (70710)**

Sample Location Well #70710		2013					2014							2015	
Description	Reference Value (mg/L)	*September*	*October*	*November*	*November Duplicate*	*December*	*January*	*February*	*March*	*April*	*May*	*September*	*December*	*3rd Quarter*	*4th Quarter*
Total Dissolved Solids	1000	320	370	310	320	310	320	300	310	320	270	310	310	310	320
WAD Cyanide	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	5.0	<0.010	0.013	<0.010	0.022	<0.010	<0.010	<0.010	0.016	0.029	<0.010	0.025	<0.010	<0.010	<0.010
Calculated Error (%)	—	4.9	5.5	10.3	1.1	7.1	3.2	2.1	<1.0	3.7	2.0	12.6	1.5	2.1	2.0

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-13. Ground Water, PW-5 (76543)

Sample Location Well #76543		2012	2013			2014		2015
Description	**Reference Value (mg/L)**	***April***	***October***	***October Duplicate***	***November***	***May***	***September***	***1st Quarter***
Certified Lab: WETLab								
Lab Reference #		1204512-002	1310357-006	1310519-001	1311201-005	1405492-005	1409827-007	1503619-004
Sample Date		4/26/2012	10/15/2013	10/24/2013	11/11/2013	5/20/2014	9/26/2014	3/19/2015
Lab Test Date		4/27/12-5/9/12	10/18/13-10/30/13	10/29/13-11/6/13	11/13/13-11/21/13	5/22/14-6/2/14	9/30/14-10/13/14	3/23/15-3/27/15
Sampled By		H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Yadon	H. Gloeckner
Bicarbonate ($HC0_3$)	—	150	140	140	140	140	120	120
Carbonate ($C0_3$)	—	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total ($CaC0_3$)	—	130	110	120	120	120	120	120
Aluminum	0.2	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045
Antimony	0.006	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Arsenic	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Barium	2	0.16	0.21	0.17	0.19	0.16	0.18	0.18
Beryllium	0.004	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Calcium	—	41	43	43	42	42	46	45
Chloride	400	54	60	58	56	58	59	61
Chromium	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Copper	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoride	4	0.37	0.30	0.29	0.22	0.34	0.27	0.22
Iron	0.6	<0.010	<0.050	0.035	0.066	0.021	0.020	<0.010
Lead	0.015	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Magnesium	150	13	14	13	14	14	14	15
Manganese	0.1	<0.0050	**1.1**	**0.29**	**0.32**	0.010	<0.0050	<0.0050
Mercury	0.002	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	<0.00010
Nickel	0.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrate + Nitrite, Total (as N)	10	0.89	<0.10	0.92	0.92	0.97	1.0	1.0
pH (standard units) [HT]	6.5-8.5	7.58	7.6	7.41	7.49	7.49	7.64	7.35
Phosphorus	—	—	—	—	—	—	—	—
Potassium	—	8.4	8.9	9.4	9.0	9.8	9.2	9.0
Selenium	0.05	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Silver	0.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	—	33	38	37	37	38	38	40
Sulfate	500	52	50	50	44	52	55	55
Thallium	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Dissolved Solids	1000	280	320	340	340	320	330	340
WAD Cyanide	0.2	<0.010	<0.050	<0.050	<0.050	<0.010	<0.010	<0.010
Zinc	5.0	0.1	0.45	0.12	0.12	0.050	0.035	<0.010
Calculated Error (%)	—	3.8	1.8	<1.0	2.4	<1.0	8.4	<1.0

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

Table E-14. Ground Water, PW-6 (73322)

Sample Location Well #73322		2013		
Description	**Reference Value (mg/L)**	***September***	***October***	***November***
Certified Lab: WETLab				
Lab Reference #		1309258-008	1310357-002	1311201-001
Sample Date		9/10/2013	10/15/2013	11/11/2013
Lab Test Date		9/13/13-9/25/13	10/18/13-10/28/13	11/13/13-11/21/13
Sampled By:		H. Yadon	H. Yadon	H. Yadon
Bicarbonate ($HC0_3$)	—	100	110	97
Carbonate ($C0_3$)	—	<1.0	<1.0	<1.0
Alkalinity, Total ($CaC0_3$)	—	82	88	80
Aluminum	0.2	<0.045	<0.045	<0.045
Antimony	0.006	<0.0025	<0.0025	<0.0025
Arsenic	0.01	<0.0050	<0.0050	**0.036**
Barium	2	0.05	0.049	0.051
Beryllium	0.004	<0.0010	<0.0010	<0.0010
Cadmium	0.005	<0.0010	<0.0010	<0.0010
Calcium	—	16	18	18
Chloride	400	12	12	14
Chromium	0.1	<0.0050	<0.0050	<0.0050
Copper	1	<0.050	<0.050	<0.050
Fluoride	4	0.92	0.81	0.7
Iron	0.6	0.032	0.049	0.04
Lead	0.015	<0.0025	<0.0025	<0.0025
Magnesium	150	6.9	8.2	6.6
Manganese	0.1	<0.0050	<0.0050	0.022
Mercury	0.002	<0.00010	<0.00010	<0.00010
Nickel	0.1	<0.010	<0.010	<0.010
Nitrate + Nitrite, Total (as N)	10	3.4	2.6	2.3
pH (standard units) [HT]	6.5-8.5	7.71	7.66	7.72
Phosphorus	—	—	—	—
Potassium	—	3.3	3	3.4
Selenium	0.05	0.0086	0.0077	0.0089
Silver	0.1	<0.0050	<0.0050	<0.0050
Sodium	—	33	29	36
Sulfate	500	26	26	31
Thallium	0.002	<0.0010	<0.0010	<0.0010
Total Dissolved Solids	1000	190	190 [HT]	180
WAD Cyanide	0.2	<0.050	<0.050	<0.050
Zinc	5.0	0.078	0.054	0.42
Calculated Error (%)	—	1.4	<1.0	4.7

Comments: All analyses for the dissolved fraction.

Results in **BOLD** represent values above or below the accepted range of reference values.

[HT] Sample was analyzed beyond the accepted holding time.

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ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX F

BIRD & BAT CONSERVATION PLAN (BBCS)

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BIRD AND BAT CONSERVATION STRATEGY
ROSSI MINE
ELKO COUNTY, NEVADA

Prepared for:

Halliburton Energy Services, Inc.
912 Dunphy Ranch Road
Battle Mountain, Nevada 89820

Stantec

Prepared by:

JBR now Stantec
595 Double Eagle Court, Suite 2000
Reno, Nevada 89521

JBR / Stantec Project Number 203714117

August 20, 2014

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ABBREVIATIONS

APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
BBCS	Bird and Bat Conservation Strategy
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMRR	Bureau of Mining Regulation and Reclamation
ESA	Endangered Species Act
Halliburton	Halliburton Energy Services, Inc
HDPE	High Density Polyethylene
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRS	Nevada Revised Statutes
PGH	Preliminary General Habitat
PPH	Preliminary Priority Habitat
SRK	SRK Consulting (U.S.), Inc.
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

1.1 SCOPE

A Bird and Bat Conservation Strategy (BBCS) is a project-specific document that delineates a program designed to reduce the potential risks of bird and bat mortality that may result from the interaction of these animals with project facilities.

Halliburton Energy Services, Inc. (Halliburton) is currently preparing to expand their existing operation at the Rossi Mine. The expansion is scheduled to go through National Environmental Policy Act (NEPA) analysis, which provides a project-specific analysis of the potential impacts to birds and bats resulting from the proposed project. Halliburton has voluntarily prepared this BBCS in compliance with federal regulations to outline project-specific practices and measures for reducing bird and bat impacts potentially resulting from the project.

This BBCS has been developed based on recommendations from the Avian Protection Plan (APP) Guidelines prepared by the Edison Electric Institute's Avian Power Line Interaction Committee and the United States Fish and Wildlife Service (USFWS) in 2005. The APP Guidelines provide guiding principles to be utilized in the development of a BBCS and thus reduce avian mortality. The following principles are outlined in the APP Guidelines:

- Corporate Policy;
- Training;
- Permit Compliance;
- Construction Design Standards;
- Nest Management;
- Avian Reporting System;
- Risk Assessment Methodology;
- Mortality Reduction Measures;
- Avian Enhancement Options;
- Quality Control;
- Public Awareness; and
- Key Resources.

1.2 GOALS OF THE BIRD AND BAT CONSERVATION STRATEGY

The voluntary implementation of this BBCS fulfills several goals simultaneously, and fulfillment of each of these goals contributes to the satisfaction of the ultimate goal of all BBCSs: to reduce bird and bat mortality. The goals specific to this BBCS are to:

- Reduce the potential for bird and bat injury or mortality by implementing specific actions;
- Identify and isolate where bird and bat mortality has occurred or has the potential to occur to minimize future incidents;
- Establish a bird and bat reporting system to document incidents of mortality caused by electrocution, heat, collision, and other project-related features; and
- Assist Halliburton in compliance with state and federal laws regarding bird and bat species to avoid the threat of penalties and fines.

1.3 IMPLEMENTATION OF THE BIRD AND BAT CONSERVATION STRATEGY

Halliburton will do the following to implement this BBCS and thus accomplish the identified goals. These actions will also be performed routinely after implementation of the BBCS to ensure goals are not only met but also maintained.

- Avoid direct impacts to nesting birds during the avian breeding season;
- Identify the environmental and behavioral factors that might lead to areas of high bird or bat use and potentially result in mortality;
- Assist in refining best management practices or protective measures, and protocols to further bird and bat conservation; and
- Ensure the accuracy and detail of incident reporting.

1.4 BENEFITS OF A BIRD AND BAT CONSERVATION STRATEGY

Bird and bat species are perhaps the most obvious groups to benefit when the goals of the BBCS are accomplished. The practical effect of such a plan may also translate to advantages for Halliburton. As the BBCS reduces bird and bat disturbance or mortality resulting from bird and bat interactions with Halliburton facilities, costs associated with such interactions could be avoided or held to a minimum. These costs may include monetary losses such as the payment of fines and penalties, repair costs for equipment damaged by bird and bat interaction, or administration and managerial time directed toward alleviating bird and bat conflicts. The BBCS reduces other costs that extend beyond monetary value, such as those attributed to negative public perception.

The voluntary implementation of a BBCS also supports compliance with the state and federal regulations as described in the following section.

1.5 FEDERAL AND STATE BIRD AND BAT PROTECTION LAWS, REGULATIONS, AND POLICY

1.5.1 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), which is administered by the USFWS, is the cornerstone of migratory bird conservation and protection in the United States. It implements four treaties that provide international protection of migratory birds. The MBTA states: "... it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or eggs of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof..." The word "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." In 1972, an amendment to the MBTA resulted in bald eagles (*Haliaeetus leucocephalus*) and other birds of prey being included in the definition of a migratory bird. The MBTA currently protects more than 800 migratory bird species, including waterfowl, shorebirds, seabirds, wading birds, raptors, and songbirds (USFWS, 2008).

1.5.2 Bald and Golden Eagle Protection Act

Under the authority of the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d), bald eagles and golden eagles (*Aquila chrysaetos*) are provided additional legal protection. The BGEPA makes it unlawful to import, export, sell, purchase, barter, or take any bald eagle or golden eagle, their parts, products, nests, or eggs. As used in the BGEPA, "take" includes pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing an eagle.

1.5.3 Endangered Species Act

The Endangered Species Act (ESA) (16 U.S.C. 1531-1544) is administered by USFWS and the Commerce Department's National Marine Fisheries Service (NMFS). USFWS has primary responsibility for terrestrial and freshwater organisms, while NMFS has responsibility for marine species. These two agencies work with other agencies to plan or modify federal projects so that they would have minimal impact on listed species and their habitats. Protection of species is also achieved through partnerships with the states, with federal financial assistance and a system of incentives available to encourage state participation.

Section 9 of the ESA makes it unlawful for a person to "take" a listed species. Under the ESA, "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Through regulation, the word "harm" has been defined by the Secretary of the Interior as "an act which actually kills or injures wildlife by

significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." However, permits for "incidental take" can be obtained from USFWS for take of endangered species, which would occur as a result of an otherwise legal activity.

1.5.4 BLM Policy

The Bureau of Land Management (BLM) has implemented policies for special status species found on BLM-managed lands. BLM's list of special status species includes species that are listed or proposed for listing under the ESA and species requiring special management consideration to promote their conservation and reduce the likelihood of future listing under the ESA. Additionally, all federal candidate species, proposed species, and delisted species (for five years after delisting) will be considered as BLM sensitive species (BLM, 2008).

1.5.5 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Signed on January 11, 2001, this Executive Order directs each federal agency taking actions that are likely to have a measureable effect on migratory bird populations to develop and implement a Memorandum of Understanding (MOU) with the USFWS that promotes the conservation of migratory bird populations. In 2010, the BLM signed an MOU with the USFWS (BLM MOU 230-2010-4) to promote the conservation of migratory birds. The mission of the MOU for the BLM is to manage habitat suitable to a variety of migratory birds, manage lands in a manner as to minimize activities that may negatively affect populations of migratory birds, and promote conservation measures that avoid impacts to nesting birds through a variety of actions, particularly for birds of conservation concern as identified by the USFWS.

1.5.6 Nevada Regulations

The State of Nevada has identified wildlife species that are declining in their range throughout Nevada or are otherwise rare. Sensitive and protected animal species are protected in Title 45 of Nevada Revised Statutes (NRS) (NRS 501.100 through 503.104). Classification of wildlife species and related regulations are detailed in Chapter 503 of Nevada Administrative Code (NAC).

1.6 ENFORCEMENT OF THE MBTA, BGEPA, AND ESA

The MBTA is a strict statute wherein proof of intent is not an element of a violation. Wording is clear in that most actions that result in a "take" or possession (permanent or temporary) of a protected species can be a violation. A violation of the MBTA by an individual can result in a fine of up to $15,000 and/or imprisonment for up to six months for a misdemeanor, and up to $250,000 and/or imprisonment for up to two years for a felony. Fines may be doubled for organizations. Penalties increase greatly for offenses involving commercialization or the sale of migratory birds or their parts.

Violators of the BGEPA may be fined up to $100,000 or imprisoned for up to one year, or both. The BGEPA has additional provisions where in the case of a second or subsequent conviction of the BGEPA, penalties may be imposed of up to a $250,000 fine or two years imprisonment, or both.

Felony violations of the ESA may result in fines up to $50,000 and/or one year imprisonment (for crimes involving endangered species) and $25,000 and/or six months imprisonment (for crimes involving threatened species). Misdemeanor violations of the ESA may result in fines up to $25,000 for endangered species and $12,000 for threatened species (USFWS, 1998).

While the ESA and BGEPA have no provisions for allowing unauthorized take, and while the USFWS generally does not authorize incidental takes under these acts, the USFWS recognizes that some birds may be killed even after all reasonable measures to avoid a "take" are implemented. Nonetheless, mechanisms exist for permitting instances where mortality may occur to species regulated by the ESA or BGEPA. Most recently on September 11, 2009, the USFWS published a final rule that established new permit regulations under the BGEPA for incidental take of eagles (74 FR 46836) while conducting otherwise lawful activities. The regulations (50 CFR 22.2) provide for permits to take bald eagles and golden eagles when the taking is associated with, but not the purpose of, an otherwise lawful activity. Under the ESA, Section 10(a)(2)(A), allows similar permit requirements for incidental occurrences, and are permitted only after developing a Habitat Conservation Plan. Neither of these permits is anticipated as a result of the Rossi Mine project.

While it is not possible under the act to absolve individuals, companies, or agencies from liability if they follow these recommended guidelines, the USFWS Office of Law Enforcement and the Department of Justice have used enforcement and prosecutorial discretion in the past regarding individuals, companies, or agencies that have made good faith efforts to avoid the "take" of migratory birds. The voluntary implementation of this BBCS is intended to proactively seek to eliminate impacts to migratory birds at the Rossi Mine.

2.0 PROJECT AREA

2.1 PROJECT AREA DESCRIPTION

The Rossi Mine is located approximately 50 miles northeast of Battle Mountain, Nevada in Elko County (Figure 1). The Rossi project boundary is currently permitted for disturbance and is actively being mined (Figure 2). The Rossi project boundary consists of approximately 1,919 acres of land. Approximately 216 acres of which are private and 1,703 acres are public.

Halliburton proposes to expand mining operations within the area shown on Figure 2 as the Rossi expansion boundary. This area consists of approximately 3,731 acres of land. Approximately 211 acres of which are private and 3,520 acres are public.

Also shown on Figure 2 is Halliburton's claim boundary for the Rossi project. This area consists of approximately 7,378 acres of land. Approximately 463 acres of which are private and 6,915 acres are public.

Public land within the project boundary, expansion boundary, and claim boundary is administered by the BLM, Elko District Office, Tuscarora Field Office. Mining operations are conducted on private (patented) claims controlled by Barrick Gold Exploration Inc. and leased to Halliburton. The unpatented claims are located on BLM land.

For the purposes of this BBCS, the claim boundary was used for analysis; however, baseline surveys described in Section 2.2 were conducted within the expansion boundary. The expansion boundary is located within all or portions of the following sections in Elko County, Nevada (Figure 2):

- Township 37 North (T37N), Range 49 East (R49E) Sections 14-16, 21-23, 26-28, and 33-35 Mount Diablo Base and Meridian.

2.2 ENVIRONMENTAL SETTING

The expansion boundary is located within the Intermountain Region, Great Basin Division, Calcareous Mountains Section floristic zone (Cronquist et al., 1972). The Calcareous Mountains Section contains high limestone-capped mountains and sagebrush-covered valleys. Vegetation within the expansion boundary is typical of the high peak and valley areas of the Great Basin, and includes a mixture of native and non-native species. Elevations range from approximately 5,300 to 6,300 feet above mean sea level. Topography is variable and is comprised of lower elevation drainages to rolling hills.

A total of 11 vegetation types were observed in the expansion boundary during 2012 field surveys (SRK, 2013). The most common vegetation type was mountain big sagebrush (*Artemisia tridentata vaseyana*), which occurs on mountain slopes and fans throughout the expansion boundary. The 11 vegetation types are presented in Table 1 and shown on Figure 3.

During the 2012 baseline surveys, two invasive species were observed: hairy whitetop (*Cardaria pubescens*) and bull thistle (*Cirsium vulgare*). Hairy whitetop was observed at the junction of a gravel county road and an ephemeral drainage. Another was identified in the northwest corner of the expansion boundary. Bull thistle was observed in the northeast and southwest corners of the expansion boundary (SRK, 2013).

Cheatgrass (*Bromus tectorum*), an invasive species, occurs throughout the claim boundary. Scotch thistle (*Onopordum acanthium*) is designated a State of Nevada listed noxious weed species (NDA, 2014) and was previously observed adjacent to the access road south of the jig plant area (BLM, 2010).

Table 1 Vegetation Communities within the Expansion Boundary

Vegetation Community	Acres Within the Expansion Boundary	Percent of the Expansion Boundary
Low Sagebrush	32	0.86
Wyoming Big Sagebrush	70	1.88
Mountain Big Sagebrush	41	1.10
Black Sagebrush	24	0.64
Meadow	46	1.23
Mixed Mountain Big Sagebrush and Low Sagebrush	1,340	35.92
Mixed Mountain Big Sagebrush and Annual Grassland	240	6.43
Mixed Wyoming Big and Mountain Big Sagebrush	475	12.73
Mixed Black, Wyoming Big, and Mountain Big Sagebrush	289	7.75
Annual Grassland	224	6.00
Anthropogenic Disturbance	935	25.06
Unmapped	15	0.40
Total	**3,731 acres**	**100%**

Source: SRK, 2013

3.0 DESCRIPTION OF ROSSI MINE

3.1 AUTHORIZED FACILITIES

Mining has occurred at the Rossi Mine since 1947. Halliburton is currently mining barite and is authorized for surface disturbance on 912 acres (BLM, 2014; NDEP, 2014). Authorized mining facilities and activities include open pits, waste rock dumps, a jig plant area, general site structures, haul and access roads, water supply facilities, and exploration.

There are three open pits at the Rossi Mine: King Pit, Queen Lode Pit, and QLEE Pit.

There are four authorized waste rock dumps at the Rossi Mine: King North, King South, Queen West, and Queen East. Waste rock dumps are constructed at the angle of repose during mining and are pushed down to a 2.5H:1V (Horizontal:Vertical) slope during reclamation.

Barite is separated from waste material via gravity separation from a jigging system. At the Rossi Mine, the jig plant area consists of a closed circuit crushing system, one jig plant, jig feed stock piles, jig tails piles, ore stockpiles, a maintenance shop, an office, a step-down transformer, and miscellaneous storage structures. Jigging occurs 24 hours a day, seven days per week. The jig plant uses water and does not require the use of reagents.

Fuels and hydrocarbon products for the site are used in the maintenance area, ready line, crusher, and jig plant. Fuels and hydrocarbon storage areas are within secondary containment, either in double-walled tanks or in high density polyethylene (HDPE)-lined containment.

Three unlined ponds are located south of the jig plant area: the upper pond, the lower pond, and the stock pond. The upper and lower ponds collect fines from the jig plant and recirculate jig water. The fines are collected and incorporated with growth media for use in reclamation. The stock pond is used for water storage, overflow, and makeup water. Mobile pumps, generators, and pipelines are used to recirculate water between the ponds and the jigging facilities.

Power to the jig plant is supplied from a step-down transformer and is provided by a NV Energy secondary substation located in the jig plant area. The line is 120 kilovolts. Well pumps and the mine contractor's maintenance area and office are powered by diesel generators.

Halliburton has six production water wells and four monitoring wells at the Rossi Mine. These wells range in depth from approximately 400 to 2,210 feet below ground surface. The production wells produce an insufficient volume of water for the jigging and dust control; therefore, additional water is required. Halliburton is authorized to convert three groundwater monitoring wells to production wells, construct nine monitoring and/or production wells, and install an

underground pipeline connecting the production wells to the jig ponds. A stock watering trough located south of the stock pond provides fresh water for local livestock and wildlife.

The project is accessed via the Boulder Valley Road. A number of roads occur within the claim boundary and include site access, secondary access, haul, and public access roads. The Boulder Valley Road public access road bypasses the jig plant area and connects to the Midas-Tuscarora Road (County Road 724). The Antelope Creek Road connects to the Boulder Valley Road south of the stock pond.

Operational lighting is used at the jig plants and in the pits. Lighting at the jig plants uses fixtures mounted on building exteriors and masts. The active pit area, ready lines, and dumps may use mobile, diesel-powered light plants at night to allow Halliburton to conduct mining operations safely and efficiently and to comply with MSHA illumination requirements. Areas are lit only when active mining or exploration is taking place. Light plants are powered by internal six kilowatt generators.

Halliburton is authorized to conduct temporary surface disturbance for exploration activities throughout the expansion boundary. Activities consist of exploration road and pad construction, surface sampling, trenching, bulk sampling, and drilling using both reverse circulation and core techniques. Exploration activities also include geotechnical investigations, geophysical surveys, and water well installation. Additional exploration activities may also occur in the Rossi Claim Block Exploration Area.

3.2 PROPOSED FACILITIES

Halliburton proposes to construct, operate, and close the following:

- Expansion of the King Pit;
- Development of the QLC Pit;
- Expansion of the King North and King South waste rock dumps;
- Development of the QLC East, QLC North, and Dawn waste rock dumps;
- Expansion and/or improvement of the ponds;
- Expansion and development of haul, secondary, exploration, and public access roads;
- Additional exploration drilling of up to 48 acres of disturbance;
- Support facilities including potable water system, septic systems, a helicopter pad, additional growth media stockpiles, a communication tower, two office buildings, stormwater control features, two additional vehicle wash facilities, a HDPE-lined maintenance pad, fuel farms, power lines, laydown yards for material and equipment storage and parking, production and monitoring wells, portable storage units, and temporary fencing.

Conventional open pit mining techniques will continue to be used to mine ore and waste rock from the proposed pits. The formation of pit lakes is not expected. Halliburton will remove

accumulations of surface/ponded water from the pits. Water removed from the pits will continue to be used for dust control.

Unlined ponds have been used for authorized mining activities since 1977. These ponds may be modernized in conjunction with the proposed water conservation infrastructure to meet Nevada Division of Environmental Protection (NDEP) and Bureau of Mining Regulation and Reclamation (BMRR) permit requirements pursuant to NAC 445A. Engineered designs will be submitted to the BLM and NDEP-BMRR prior to construction.

Stormwater control features such as channels, sediment basins, check dams, and culverts will be designed to handle the 100-year, 24-hour storm event. Stormwater upgradient of the stockpond will be collected, diverted to the stock pond, and used for jig water. Stormwater downgradient of the stockpond is diverted to prevent run-on and run-off from contacting operating areas. Facilities will be monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective and operating properly.

Water for jigging and dust suppression will continue to be used. Stock tanks will be located near production wells, as needed, to provide water for livestock and wildlife.

Halliburton will extend the existing power line to provide service required for future mining-related activities. New power lines will provide power to the jig plant area, the potable water system, production wells, the ready line/maintenance area, and office buildings. Where the proposed power supplies need to cross a haul route, the power line may be buried. In areas without electrical infrastructure mobile generators will be used. These areas could include well sites, construction sites, equipment maintenance sites, and mobile equipment parking areas.

Exploration activities will include constructing drill pads approximately 80 by 100 feet and 14-foot running width access roads. Sumps may be located on or off the pad with a maximum size of 40 by 50 feet and will be constructed with one end sloped to provide egress for wildlife; multiple sumps may constructed at each drill pad. Sumps will be allowed to evaporate and be backfilled as soon as practicable.

Temporary fencing (livestock panels, three-strand wire, orange barrier fence, etc.) may be erected as needed for safety, livestock exclusion, or to meet regulatory requirements.

Halliburton will continue to collect solid waste in dumpsters and transport this material to an approved off-site solid waste landfill. Petroleum-contaminated soils resulting from spills or leaks of hydrocarbons will be removed from the spill site and placed in a dedicated dumpster and transported off-site to an approved facility in accordance with federal, state, and local regulations.

4.0 SPECIES OF INTEREST

4.1 SENSITIVE SPECIES CRITERIA AND UTILIZATION OF EXPANSION BOUNDARY

In this BBCS, the term "sensitive species" encompasses all bird and bat species that are protected by any one or more of the laws, policies, or regulations described in Section 1.5 of this document. Specifically, this includes:

- All bird and bat species that are listed as threatened or endangered species or are proposed or candidates for listing under the ESA of 1973 as amended;
- All avian species extended protection under the MBTA;
- Bald and golden eagles extended protection under the BGEPA;
- All bird or bat species that the state of Nevada extends protection to through NRS 501.100–503.104, NRS 527.050, and/or NRS 527.60–527.300; and
- All species identified as BLM sensitive species in Nevada.

Regardless of whether a bat or bird species is protected by regulation, law, or agency directive, the ultimate goal of this BBCS is to provide protection to all bird and bat species that may interact with the project facilities.

Most bird species that occur or have potential to occur within the expansion boundary would be considered protected species under the MBTA, as the act protects all native birds commonly found within the Elko District, with the exception of gallinaceous species (upland game birds) and introduced, non-native species. Other birds such as the golden eagle or loggerhead shrike are protected by the MBTA in addition to other listings, such as the BGEPA or listing on Nevada BLM Sensitive Species list. The greater sage-grouse is not protected under the MBTA; however, it is listed as a candidate species for listing under the ESA.

4.2 SENSITIVE SPECIES POTENTIALLY OCCURRING WITHIN THE EXPANSION BOUNDARY

SRK Consulting (U.S.), Inc. (SRK) conducted baseline surveys for wildlife species during the spring/summer of 2012. Thirty-nine species of birds and five species of bats were identified during 2012 baseline surveys (SRK, 2013).

During the 2012 surveys, five species of raptors were observed in or adjacent to the expansion boundary including golden eagle, northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture (*Cathartes aura*). Western

burrowing owls (*Athene cunicularia*) were noted as having potential to occur within the expansion boundary; however, none were identified during the surveys (SRK, 2013).

Follow-up surveys to the previous surveys and to identify golden eagle use within 10 miles of the project boundary were conducted in 2013 and 2014. In 2013, 11 golden eagle nests were visited in which four were active and seven were inactive. In 2014, 11 golden eagle nests were visited in which four were active and seven were inactive (SRK, 2014). Locations of raptor nests and status from 2013 are shown on Figure 4A and locations of raptor nests and status from 2014 are shown on Figure 4B.

In 2012, SRK also surveyed for greater sage-grouse leks and sign in the expansion boundary and its vicinity. The greater sage-grouse is currently a candidate for listing under status review by the USFWS. It is a BLM-sensitive species and a State of Nevada-protected game bird managed in accordance with the *Greater Sage-Grouse Conservation Plan for Nevada and Eastern California* (NDOW, 2004).

Greater sage-grouse historical habitat distribution data has been kept by the Nevada Department of Wildlife (NDOW). On March 15, 2012, the BLM issued a White Paper on greater sage-grouse habitat on BLM and United States Forest Service (USFS)-managed land (BLM, 2012). The paper states that the BLM and USFS will focus on two categories of greater sage-grouse habitat including Preliminary Priority Habitat (PPH) and Preliminary General Habitat (PGH). Areas of PPH or PGH indicate where land-use changes could result in a negative impact to greater sage-grouse population health. The BLM used the NDOW Habitat Categories to determine PPH and PGH habitat types.

PPH is classified as breeding habitat, lek sites, nesting habitat, brood-rearing habitat, winter range, and movement corridors. Habitat for greater sage-grouse primarily consists of sagebrush; however, it can include riparian areas, perennial grassland, agricultural land, and restored land; all are particularly important as brood-rearing habitat.

PGH consists of habitat similar to PPH although it typically lacks one or more key components that prevent it from being categorized as primary habitat. For example, sagebrush and understory may be present yet of insufficient height. This habitat type also includes sagebrush communities with pinyon-juniper encroachment, unrecovered burn areas, and areas that lack bird survey and inventory data to support a higher ranking.

The expansion boundary is located within the Tuscarora Population Management Unit. PPH is located within the project boundary, expansion boundary, and claim boundary. There is no PGH located within any boundary. Figure 5 shows mapped greater sage-grouse habitat categories.

Four greater sage-grouse leks occur within three miles of the expansion boundary. NDOW conducted an aerial survey of leks in the area in 2012. No new leks were discovered in the

vicinity of the project during these flights. All four leks were surveyed during spring 2012 and 2014. During both years, one lek was active and the remaining three were inactive (SRK, 2013 and SRK, 2014). Greater sage-grouse scat was also observed within the three boundaries as shown on Figure 5.

Also in 2012, acoustic surveys were conducted for bat species using Pettersson D-240X Bat Detectors. Twenty-four nights of acoustic data were collected for the Rossi Mine. Roosting habitat in the expansion boundary consists of rock outcrops. No trees, old buildings, or abandoned mine workings (e.g., shafts, adits, inclines) are present, and relatively few outcrops are located in the expansion boundary. The existing pit walls in the expansion boundary have very few crevices suitable for bat roosting. The entire area serves as potential foraging habitat. Some species of bats use large shrubs and leaf litter as potential day roosting habitat, which is present within the expansion boundary. Bat use of the habitat within the expansion boundary is limited without long-term hibernacula or maternity roosting habitat available. Species which were recorded in the area include Mexican free-tailed bat (*Tadarida brasiliensis*), little brown bat (*Myotis lucifugus*), and Western small-footed myotis (*Myotis ciliolabrum*). One additional species was recorded; however it is unknown if it was a California myotis (*Myotis californicus*) or Yuma myotis (*Myotis yumanensis*) because of the similarity in their calls (SRK, 2013). For the purposes of this BBCS, both species will be included in analysis.

Table 2 lists the bird and bat species that have been documented during baseline surveys conducted for the project.

Table 2 Bird and Bat Species Occurring in the Expansion boundary

Species Name	
Common	**Scientific**
Bat Species	
California myotis[1]	*Myotis califomicus*
Mexican Free-tailed Bat[1]	*Tadarida brasiliensis*
Little Brown Bat[1]	*Myotis lucifugus*
Western small-footed myotis[1]	*Myotis ciliolabrum*
Yuma myotis[1]	*Myotis yumanensis*
Bird Species	
American avocet	*Recurvirostra americana*
American coot	*Fulica americana*
American robin	*Turdus migratorius*
Black-billed magpie	*Pica hudsonia*
Black-throated sparrow	*Amphispiza bilineata*
Brewer's blackbird	*Euphagus cyanocephalus*
Brewer's sparrow[1]	*Spizella breweri*
Brown-headed cowbird	*Molothrus ater*
Canada goose	*Branta canadensis*

Species Name	
Common	**Scientific**
Chukar	*Alectoris chukar*
Cinnaman teal	*Anas cyanoptera*
Cliff swallow	*Petrochelidon pyrrhonota*
Camman nighthawk	*Chordeiles minor*
Camman paarwill	*Phalaenoptilus nuttallii*
Camman raven	*Corvus corax*
Galden eagle	*Aquila chrysaetos*
Greater sage-grause[1]	*Centrocercus urophasianus*
Horned lark	*Eremophila alpestris*
Hause finch	*Carpodacus mexicanus*
Killdeer	*Charadrius vociferus*
Lark sparraw	*Chondestes grammacus*
Laggerhead shrike	*Lanius ludovicianus*
Mallard	*Anas platyrhynchos*
Mountain bluebird	*Sialia currucoides*
Maurning dave	*Zenaida macroura*
Northern harrier	*Circus cyaneus*
Prairie falcan	*Falco mexicanus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Redhead	*Aythya americana*
Rack wren	*Salpinctes obsoletus*
Sagebrush sparraw	*Artemisiospiza nevadensis*
Sage thrasher[1]	*Oreoscoptes montanus*
Spatted sandpiper	*Actitis macularia*
Turkey vulture	*Cathartes aura*
Western meadawlark	*Sturnella neglecta*
Vesper sparraw	*Pooecetes gramineus*
Yellaw-headed blackbird	*Xanthocephalus xanthocephalus*

[1]BLM Sensitive Species
Source: SRK, 2013

5.0 THREAT ASSESSMENT

5.1 ROSSI MINE PROJECT COMPONENTS

The following are project components that may pose mortality or injury threats to bird and bat species that may use the area.

5.1.1 Open Pits

Development of open pits has the potential to attract avian species to the area. Avian species potentially utilizing the pit walls may include raptors and corvids (ravens and crows) among others, which may find the uneven pit walls suitable for nesting. Open pits may also provide perching opportunities for raptors. However, blasting to break up rock is a common event on site and the combined activity in the open pits has been and would likely continue to be sufficient to prevent any successful nesting attempts by raptors or other species.

5.1.2 Jigging Facilities

The jig plant requires the use of water, which may attract avian species to the area. The constant use of the plant as well as the activity generated by the plant and the employees operating the plant would likely prevent nesting attempts on the equipment or use of the immediate area for water or forage activities.

5.1.3 Lighting

Operational lighting is used at the jig plants and in the open pits. Aerial foraging avian species have been observed feeding on swarms of flying insects attracted to continuously burning artificial light sources at night (Lebbin et al., 2007). Some bat species are be anticipated to feed on swarms of insects attracted to artificial light sources as well, considering flying insects are primary forage for many bats. Birds and bats could potentially collide with the lighted structures while foraging.

5.1.4 Ponds

Three ponds are located on site that attract bird and bat species to the area. Results of the Rossi Mine characterization program indicate that acid generation is not predicted for any of the Rossi Mine waste rock, ore, or jig by-products. If modifications to the ponds occur, such as lining the ponds, there may be impacts to birds and bats not currently associated with the ponds. Pond liners can become slippery and make it difficult for wildlife to exit ponds and potentially drown.

5.1.5 Transmission Lines and Poles

Transmission lines and poles may potentially be utilized as perching and roosting habitat for many bird species. Power poles place raptors at a considerable elevation above the surrounding terrain, offering an ideal hunting position and high point for defending territory.

Raptors are opportunistic and may use power poles for a number of purposes, including nest sites, high points from which to defend territories, and perches from which to hunt prey. Hunting from a perched position is energetically efficient for a bird, provided the bird has a view of quality prey habitat. Nesting on power poles allows a raptor a high point from which to defend the nest and diminishes the threat of nest predation from reptiles and mammals. Regardless of whether they are foraging or nesting, birds on or near the ground surface may feel susceptible to predators utilizing power poles.

5.1.6 Miscellaneous Facilities

There are currently several miscellaneous facilities in place at the Rossi Mine. These facilities provide suitable nesting substrate to several small to medium sized avian species. Several of the ancillary facilities also have the potential to introduce alternate sources of water in the area (e.g. vehicle washes, potable water system, etc). These areas have the potential to attract various migratory birds. The majority of the facilities are low to the ground and do not exceed a height of two stories. While facilities are low to the ground, they may still pose a collision risk. Additionally, these facilities have few windows, which also limits the potential for avian collisions. Given the design of these facilities, avian collisions likely involve individuals flying low (landing or taking off). The use of perch deterrents on ledges, rooftops, and other areas limits the attractiveness of these facilities to avian species and further reduces the potential for collisions. However, sometimes perch deterrents provide a base for some birds to make nests, such as corvids. Regular human activity in the area is also a deterrent.

Ancillary facilities in place at the Rossi Mine include a ready line, two maintenance buildings, fuel storage areas, HDPE-lined wash and maintenance pads, explosive storage, laydown yards, firebreak, growth media stockpiles, office and storage trailers, a truck scale, stockpiles for ore, jig feed, jig tails, and jig product, water storage tank, meteorological station, portable toilets, solid waste containers, and ancillary disturbance.

Proposed facilities may include support facilities including potable water system, septic systems, a helicopter pad, additional growth media stockpiles, two office buildings, stormwater control features, two additional vehicle wash facilities, an HDPE-lined maintenance pad, fuel farms, power lines, laydown yards for material and equipment storage and parking, lysimeters, production and monitoring wells, portable storage units, and temporary fencing. A communication tower has also been proposed which could cause bird and bat collisions.

5.1.7 Roads

Currently at the Rossi Mine, there are approximately 15 acres disturbed as roads. Additional haul roads and access roads are proposed. Certain passerine species are known to use roads for foraging of wind-blown seeds. Additionally, should any wildlife mortality occur from wildlife-vehicle collisions, scavenging species (e.g. turkey vultures, ravens, raptors) may begin to forage along project roads. The Rossi Mine has enforced speed limits of 10 miles per hour around facilities and at the ready lines and 30 miles per hour on haul roads and access roads to minimize the risk of collision.

5.1.8 Fencing

Temporary fencing may be erected as needed for safety, livestock exclusion, or to meet regulatory requirements. Similar to power poles, fencing can often times be higher than the surrounding vegetation. This provides perch opportunities for raptors and other birds. Birds such as greater sage-grouse have been document colliding with wire fences (Stevens et al., 2012).

5.1.9 Surface Disturbance

Expansion projects and exploration in the area will result in new surface disturbance. Direct impacts could occur to golden eagles and migratory birds since the project construction removes potential foraging and nesting habitat for these species. The dominant habitat in the area consists of mountain big sagebrush. Future projects have the potential to remove the available migratory bird nesting and foraging habitat, golden eagle foraging habitat, and bat foraging habitat.

Most birds are highly mobile, and initial construction activities do not occur during nesting periods; therefore, it is unlikely that surface disturbance activities associated with project construction would result in bird injury, death, or nest abandonment. However, a few species such as western burrowing owls may be more susceptible to injury or death during surface disturbance activities because they may hide in their burrows and not be able to flee prior to the burrow being covered. Surface disturbance activities could destroy nests if these activities occur during the nesting season; however, disturbances to nesting birds are circumvented by avoidance and minimization measures. Currently, avoidance and minimization measures at the Rossi Mine include restricting surface disturbance activities during migratory bird breeding season (March 15 to July 31) or having a qualified biologist conduct pre-construction surveys to identify the presence of active nests prior to surface disturbing activities so that nests can be identified and avoided.

5.1.10 Exploration Drilling

In general, most bird and bat species would likely avoid the drill pads constructed for this project due to the increased activity and human presence at those locations. This is especially true of larger species of birds that forage over large areas. However, certain species of birds may use the open areas associated with the construction of drill pads for foraging. Horned larks have been observed to increase concentrations along newly constructed roads in sagebrush habitats (Inglefinger and Anderson, 2004). This is likely due to an increased presence of seeds and other forage available. This may translate into the use of the well pads by certain species. Bird and bat species are also attracted to open bodies of water; however, given the small nature of sumps there will be minimal open pits containing fluids for minimal amounts of time. Additionally, drill rigs may provide suitable nesting substrate to some avian species; however, the noise and human activity around these drill rigs would likely preclude any bird use of these rigs.

5.2 CAUSES OF BIRD AND BAT MORTALITY

5.2.1 Collision

Avian species have been documented colliding with transmission lines and structures, and a number of factors contribute to this risk. The Avian Power Line Interaction Committee (APLIC) document, *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC, 2012), outlines collision risk factors for avian species, which include:

- Exposure to collisions is largely a function of behavior. Specific behaviors (such as flushing, courtship displays, and aerial hunting) may distract birds from the presence of power lines and structures;
- Exposure is increased for birds that make regular and repeated flights between nesting, feeding, and roosting areas in proximity to power lines and structures;
- Susceptibility to collisions is partially a function of wing and body size and vision. Larger, heavy-bodied birds with short wing spans and poorer vision are more susceptible to collisions than smaller, lighter-weight birds with relatively large wing spans, agility, and good vision;
- Environmental conditions (such as inclement weather and darkness) may distract birds from the presence of power lines or obscure their visibility; and
- Engineering aspects, including design and placement, can increase or decrease the exposure for collisions.

5.2.1.1 Ancillary Facilities

The potential for bird and bat species to collide with the various support buildings at the Rossi Mine is present when avian species are in flight during adverse environmental conditions, such as rain, fog, strong winds, or other similar periods of low visibility. Bird and bat species are also subject to collision with the facilities when flying while distracted. Potential distractions could include foraging, territorial chases, mating, escape from predators, nearby human activity, or other activities that result in aggressive and swift flight, or erratic and fear-driven flight. Birds do collide with building windows, which may be due to the reflections of surrounding landscape in the windows (Cornell, 2013).

5.2.1.2 Transmission Lines and Power Poles

Bird and bat species are susceptible to collisions with the transmission lines and power poles, particularly when newly installed.

The risks to avian species relate to a species characteristics; in particular the birds' body size, weight, wing shape, flight behavior, and nesting habits. For example, literature shows that, in general, birds of prey are good fliers, have the ability to avoid obstacles, and are not prone to collisions. It is when they are engaged in certain activities (e.g., territorial defense, pursuing prey)

that their collision risk increases (Harness et al., 2003; Olendorff and Lehman, 1986 as cited by APLIC, 2012).

These same risk factors could be applied to bat species. Bats are most active in low light to dark hours. While bats typically navigate and forage by emitting and receiving high-frequency sound (echo-location), bats not actively echo-locating may fail to detect the transmission lines or poles when in flight.

5.2.1.3 Roads

Bird and bat species are susceptible to potential collisions with project vehicles along both the access roads in the expansion boundary as well as the highways leading to the area. Mentioned above, some species of birds are attracted to newly constructed roads for wind-blown seeds, or for the increased presence of carrion. An individual sufficiently distracted during foraging would be at an increased risk of collision. For smaller passerine species, there is risk along the newly constructed roads where plants seeds are more likely to accumulate on the road bed. The risk to scavenging raptors and other scavengers; however, would be greatest along the highways leading to the project where higher vehicle speeds are more likely to result in vehicle strikes with wildlife, thereby presenting a source of food for the birds.

5.2.1.4 Exploration Drilling

Similar to ancillary facilities, bird and bat species are susceptible to collisions with the drilling rigs, particularly those with lights during avian migration.

5.2.1.5 Lighting

The USFWS has expressed concern that an increase in lighting may affect migrating birds, many of which fly at night. Migrating birds may become attracted to or disoriented by artificial lights, particularly during inclement weather (Rich and Loncore, 2005). This disorientation represents a hazard when artificial lighting is present, as birds may collide with structures that are providing the light or structures that are being lit. According to Rich and Loncore (2005), red lights on towers are thought to be more disorienting than white lights.

5.2.2 Electrocution

5.2.2.1 Transmission Lines

Avian electrocutions can occur when a bird completes an electric circuit by simultaneously touching two energized parts or an energized part and a grounded part of the electrical equipment. The reason birds may complete an electric circuit can be attributed to two interrelated factors: environmental factors and engineering factors (APLIC, 2006 and 2012).

Environmental factors are naturally occurring factors that affect avian use of power poles. The behavioral and biological characteristics unique to individual avian species determine in part how that species utilizes power poles, and affect their potential to suffer electrocution from such use. Behavioral and biological characteristics include the physical size and shape, foraging characteristics, flight pattern, and territorial traits of the species. Environmental factors also

include the natural topography of the area, vegetation in the area, available forage and prey in the area, and weather. These factors affect the behavior of birds. Eagles are the most commonly reported electrocuted avian species, with golden eagles reported to suffer electrocution 2.3 times more frequently than bald eagles (Manville, 2005).

Engineering factors include the physical design and construction of the electrical system, including the transmission lines, power poles, transformers, and other components of the system. A bird may potentially come into simultaneous contact with two energized conductors or an energized conductor and grounded hardware if the spacing between any of these two components is inadequate. When such contact occurs, an electric circuit is completed and the result is electrocution (APLIC, 2006 and 2012).

5.2.2.2 Bird Nesting

Nests on power transmission structures that pose the greatest risk to birds are those that are built in close proximity to energized conductors and hardware. While a nest that is not in close proximity to energized parts may not be an electrocution risk in and of itself, it tends to cause the nesting birds and possibly nest predator birds to routinely land on other parts of the power pole or surrounding poles that may be unsafe (APLIC, 2006 and 2012). In the expansion boundary, the species most likely to nest on power poles are ravens and raptors.

5.3 EFFECTS TO BIRD AND BAT SPECIES

5.3.1 Effects from Project Construction and Operation

Effects to bird and bat species are similar across all of the project components. Direct impacts could occur to bird and bat species since the project construction removes potential foraging and nesting habitat. Reclamation practices and demonstrated revegetation success at Rossi Mine serves to minimize temporary vegetation loss. The project would not restrict bird or bat migration throughout the area; however, it has removed a small proportion of the available migratory bird nesting and foraging habitat and bat foraging habitat in the area.

Most birds are highly mobile, and construction activities do not typically occur during nesting periods; therefore, it is unlikely that grading activities associated with project construction would result in bird injury or death because most birds can flee the area. However, a few species such as western burrowing owls may be more susceptible to injury or death during grading activities because they may hide in their burrows and not be able to flee in time. Grading activities could destroy nests; however, disturbances to nesting birds are circumvented by avoidance and minimization measures.

Avoidance and minimization measures include restricting grading activities during the migratory bird breeding season (March 15 to July 31) or having a qualified biologist conduct pre-construction clearance surveys prior to grading activities so that nests can be identified and avoided. Avoidance of nests will be accomplished by establishing buffers around identified nests. Buffer size will be in accordance with the BLM species specific recommendations.

Increased noise levels during construction may cause birds to avoid the area temporarily, possibly disrupting normal behavior patterns. Increased noise levels have been shown to adversely affect greater sage-grouse and golden eagles. Lyon and Anderson (2003) showed that increased noise levels that repeatedly disturb birds near leks may lead to males and females abandoning leks. Four greater sage-grouse leks occur within three miles of the expansion boundary. Suitable nesting habitat for golden eagles is present within a mile of the Proposed Action. General reactions of golden eagles to noise and disturbance include:

- Agitation behavior (displacement, avoidance, and defense);
- Increased vigilance at nest sites;
- Change in forage and feeding behavior; and
- Nest site abandonment (Pagel et al., 2010).

5.3.2 Effects from Open Pits and Waste Rock Disposal Areas

A potential direct effect of the project operations on bird and bat species is the death or injury resulting from blasting operations associated with development of the pits. Blasting is anticipated to occur on a daily basis. Any avian species in the vicinity of the blasting operations may potentially suffer mortality or injury directly from the blast or from flying debris. This impact is alleviated somewhat by the around-the-clock activity at the open pits, which tends to keep wildlife away. The daily blasting itself may aid in deterring any bird or bat species from entering the blast radius although a small number of individuals may enter the area after the charges are set and before they are detonated.

An increase of people and noise from project operations at the open pits could impact golden eagles and/or greater sage-grouse. The impacts from operations would be long-term and last for the life of the mine.

5.3.3 Effects from Transmission Lines and Power Poles

Direct effects on birds resulting from project operation of the transmission line may include injury or mortality from transmission line collisions and/or electrocutions.

In addition to collisions and electrocutions, electromagnetic fields may affect birds that roost or nest near transmission lines. Electromagnetic fields could affect a number of factors including but not limited to fertility rates, nest success, egg quality, and hatch success. The complete range of effects for birds in the area is unknown.

Not all direct impacts of the transmission line may be adverse. Recent research shows that raptors and corvids may benefit from the presence of transmission lines because they may provide more roosting or nesting opportunities (Steenhof et al., 1993). This study also found that nest success for golden eagles was higher (10 percent) for nests on transmission lines than for nests on cliffs. Conversely, the increased perching opportunities for raptors are a known threat to greater sage-grouse. Raptors and corvids that prey on greater sage-grouse have additional perching locations, which may increase their predation on greater sage-grouse and their nests.

Introduction of a new transmission line in the valley may increase perching opportunities for raptors, owls, and other avian predators. These avian species may increase the predation pressures on vulnerable species, such as other bird or bat species in the area.

5.3.4 Effects from Ponds

Direct effects may include bird or bat injury or mortality during operation because of the presence of ponds associated with the Rossi Mine; however this is unlikely. Ore is processed on site through a water beneficiation process (gravity separation). No chemicals are used in this process, and the material processed on-site is non-potentially acid generating. There are no added chemicals or toxins that are of concern to wildlife in the ponds, and the water in the ponds attracts wildlife to the area. Should the ponds be modified and lined, wildlife may drown in the ponds due to steeply lined, slippery slopes that make it difficult for wildlife to exit the pond. Should modifications to the ponds occur, Halliburton will coordinate with NDOW to determine if their proposed pond modifications would require an Industrial Artificial Pond Permit for the project. This permit would require that Halliburton submit a Quarterly Wildlife Mortality Report Form to NDOW.

5.3.5 Effects from Ancillary Facilities

The operation of the ancillary facilities in the expansion boundary has minimal impacts to bird and bat species. The primary impact from the operations of these areas is from personnel and vehicle use in the area. Noise and human disturbance have a temporary impact on migratory birds and displace them to areas outside the active mining area. The intensity of these impacts varies from species to species; however, the impacts from the Rossi Mine have been anticipated to be long-term, lasting the life of the project.

6.0 BIRD AND BAT PROTECTION MEASURES AND MODIFICATIONS

In order to protect bird and bat species, Halliburton will continue to employ a number of protection measures and modifications at the Rossi Mine. These measures will be in place throughout the life of the project.

6.1 GENERAL AVIAN PROTECTION MEASURES

- Halliburton will attempt to conduct surface disturbance activities outside the avian breeding season to prevent the destruction of active bird nests or of young birds. According to Halliburton's Rossi Mine Expansion Environmental Assessment (DOI-BLM-NV-N020-2010-0008-EA), the breeding season occurs from March 15 to July 31 (BLM, 2010).

- If it becomes necessary to clear land during the breeding season, a survey for active nests within areas to be cleared will be conducted by a qualified biologist. Ground disturbance will occur within 14 days of the survey if no active nests are identified. If disturbance does not occur within 14 days, a new survey will be required. Also according to Halliburton's Rossi Expansion Environmental Assessment, if an initial survey takes place after May 1 a single survey can suffice and the 14 day restriction will not be imposed (BLM, 2010). If active nests are identified, a protective buffer will be established where disturbance activities will not be permitted. The size of the buffer and its duration will be based on the species. Halliburton will coordinate these efforts with BLM biologists.

- For all non-raptor bird species, surveys shall cover all potential nesting habitat in and within 300 feet of the area to be disturbed.

- Because there are no standardized disturbance buffers for active non-raptor bird nests, if active nests are detected, a no-disturbance buffer zone (as determined by USFWS, NDOW, and/or BLM) will be established. Nest locations shall be mapped and submitted to the BLM as needed.

- Active bird nests will not be moved during the breeding season unless Halliburton is expressly permitted to do so by the USFWS, BLM, and NDOW.

- All active nests and disturbance or harm to active nests will be reported within 24 hours to the USFWS, the BLM, and NDOW upon detection. The biological monitor will halt work if it is determined that active nests are being disturbed by construction activities, until further direction or approval to work is obtained from the appropriate agencies.

- The maximum speed limit for all project vehicles in the expansion boundary will be no more than 30 miles per hour.

- Garbage shall be removed at frequent intervals to avoid attracting scavengers and avian predators to the site.

- Formalize procedures for verbal and written reporting of wildlife mortalities to NDOW.

6.2 TRANSMISSION LINE PROTECTION MEASURES

Overhead power lines will incorporate standard raptor protection designs as outlined in *Suggested Practice for Avian Protection on Power Lines* (APLIC, 2006). Where the proposed power supplies need to cross a haul route, the power line may be buried.

The Rossi Mine is served by a 120 kilovolt line that was completed in 2013 by NV Energy. This line runs between the Coyote Creek Substation and the Bell Creek Substation that serves as part of the local transmission network in the Carlin Trend area. The segment that extends off this main line to the Rossi Mine is 3,176 feet. The line has five structures including Structure 1, a 3-pole tap structure; Structure 2, a 3-pole switch; Structures 3 and 4, two 2-pole H-frame structures; and Structure 5, a 3-pole angle.

Structures 1, 2, and 5 utilize guy wires. Any lines and guy wires are typically marked with recommended bird deterrent devices. In areas where greater sage-grouse habitat is present, it is standard practice for NV Energy to utilize plastic covers on guy wires to deter avian collisions. Perched birds can predate on greater sage-grouse and small mammals in the area. Accordingly, Structures 2, 3, and 4 have horizontal crossarms that include perch-deterrent plates. Structures 1 through 4 also have plastic pole-top cones installed to prevent birds from perching on the pole tops. The anti-perch devices reduce avian use of the power poles, which could consequently reduce potential collisions with the poles.

In order to minimize collisions, all new transmission lines utilize wire marking. Typical and commonly accepted wire marking methods have been used as needed, including placing crossed bands between the wires or hanging material from the lines (typically the static, upper line). Additionally, the existing transmission lines have been constructed adjacent to existing mine operations. This may contribute to improved visibility of transmission lines or avoidance of the lines since it is located in a concentrated area where active mining is occurring.

New power poles are constructed utilizing raptor-safe guidelines such as those recommended by the APLIC (2006). The APLIC recommends at least five feet of clearance between phases and any electrical ground. Typically, 120 kilovolt lines are not thought to pose electrocution hazards to birds because of the spacing between lines. Each phase of the three-phase transmission line has been spaced approximately five to seven feet from each other, depending on the power pole structure. There is between six and seven feet of clearance from any line to another, which prevents birds, including golden eagles, which are expected to be the largest bird in the area with an average wing span of six feet, from completing an electrical circuit and suffering electrocution through the transmission lines.

7.0 IMPLEMENTATION AND ADAPTIVE MANAGEMENT ACTIONS

7.1 HALLIBURTON POLICY

Halliburton will voluntarily adopt and implement the bird and bat protection measures as described in this BBCS to reduce the potential for bird and bat mortality.

7.2 AVOIDANCE AND MINIMIZATION

Halliburton has agreed to several measures to avoid and minimize impacts to bird and bat species during project construction and operation that are discussed in Section 6.0 of this document. Lighting (when used) will be controlled to minimize the potential for bird and bat collisions (i.e. angled down). Any potentially toxic material that may pose a threat to bird and bat species will be stored on-site and protected in such a way as to prevent and control potential spills. A list of all potentially hazardous materials will be provided to the BLM.

In order to minimize impacts to migratory birds during initial construction activities, Halliburton will avoid, when possible, land-clearing activities such as vegetation removal during the avian breeding season (March 15 to July 31). These dates may be modified by BLM based on specific site and weather conditions. If land-clearing activities take place during the avian breeding season, a qualified biologist will conduct preconstruction surveys in the affected area to identify nests and breeding birds.

During project operations, vehicles will travel on project roads to minimize destruction of the native habitat in the area. This minimizes habitat impacts and the potential for crushing bird and bat species during project-related activities.

7.3 ASSESSMENT AND IMPLEMENTATION APPROACHES

7.3.1 Reactive Approach

The reactive approach includes implementation of adaptive management actions after avian or bat mortality has occurred. As incidents occur, Halliburton will respond appropriately through documentation via the Bird and Bat Reporting System (Section 8.0). The post-construction monitoring procedures described in Section 9.0 will also report and record mortality impacts among bird and bat species interacting with the project facilities. These reports will be provided to the USFWS, NDOW, and BLM. The reported mortality impacts will be assessed by the three agencies in collaboration with Halliburton to determine whether the impact justifies implementation of adaptive management actions. This determination includes several factors, including the species of avian or bat impacted, whether that species is listed as threatened or

endangered, the rarity of the species, the effects on the population level of that species, and consideration of previous mortality resulting to that species at the project site (e.g., a number of mortality events to a particular species), or as a result of interaction with that project facility. Adaptive management actions will be developed based on many of these same factors. The development of specific adaptive management actions would occur collaboratively among the USFWS, NDOW, BLM, and Halliburton, and will be based on scientific data, effective actions implemented at similar projects, new technology developed during the life of the project, and other similar or related information. The success of the techniques shall be determined collaboratively as well.

Not all impacts warrant implementation of adaptive management actions. The decision to implement adaptive management will be made between Halliburton, USFWS, BLM, and NDOW. Although the mortality of a bat or bird or several bats and birds would occur before a reactive measure would be implemented, further bird and bat impacts would be avoided or minimized by removing the threat or changing timing or behavior (depending on the mechanism of mortality, if known).

7.3.2 Preventative Approach

Preventative measures include all of the initial protection measures described in this document that would be constructed into the project components in order to minimize mortality, such as surveys for migratory bird nests, informing employees that harassing wildlife is not permitted, and reducing speed on project roads. Preventative measures attempt to avert potential bird and bat mortality before the potential becomes reality. Effective preventative measures can help prevent possible violations of the MBTA, ESA, and BGEPA.

Preventative measures also include measures implemented to minimize or eliminate the potential for bird and bat mortality resulting from non-operational risks associated with the project, such as construction impacts. Measures may be outlined in the NEPA document that will be prepared for this project.

7.4 PERMIT COMPLIANCE

There may be situations where Halliburton finds it necessary to obtain additional federal and state permits regarding bird or bat species as it relates to mortality and to bird nest removal and relocation. These could include collection or salvage permits, nest removal and relocation permits, and incidental take permits. In such situations, Halliburton would work with the federal and state resource agencies listed in Section 7.9 to determine which permits are necessary and to acquire relevant permit applications. Under no circumstances would Halliburton perform any activity requiring a permit without first obtaining the proper permit or authorization to perform the activity.

7.5 PERSONNEL TRAINING

In order to effectively implement the BBCS, Halliburton will ensure that all appropriate personnel undergo training on the issues and protocols outlined in the BBCS. This training ensures that all appropriate personnel have a thorough understanding of the BBCS and their responsibility to bird and bat protection and regulatory compliance.

7.6 BIRD AND BAT ENHANCEMENT OPTIONS

Halliburton will continue to protect natural resources and promote actions that benefit local and regional bird and bat populations. Halliburton will limit project disturbance to the area within the expansion boundary the extent possible thus, maintaining vegetation outside of the expansion project boundary that will maintain nearby nesting and foraging habitat for bird and bat species. Areas disturbed will eventually be reclaimed with a BLM-approved seed mix to help restore vegetation in cleared areas. After completion of the project, the area will be restored to pre-project like conditions.

7.7 QUALITY CONTROL

In consultation with USFWS, BLM, and NDOW, Halliburton will assess various parameters and protection measures as described in this BBCS to ensure that it is as efficient and effective as possible. Assessment of these parameters will take place at the time of the next proposed action or if significant impacts to birds or bats have been documented through consultation with the USFWS, BLM and NDOW. Parameters that Halliburton will assess include:

- Assessing bird and bat protection devices to identify products preferred for bird and bat protection as well as ease of application and durability;
- Assessing mortality reporting procedures to ensure that discoveries of avian mortalities are properly documented;
- Assessing response to avian mortalities to ensure that appropriate actions are taken in a timely manner;
- Assessing compliance with company procedures to ensure that personnel are consistently following company methods for avian- and bat-safe construction, mortality reporting, nest management, etc.; and
- Assessing public and agency opinions on system reliability and avian protection.

These parameters will be assessed during each review of the BBCS as necessary. Additional parameters other than those listed above may be assessed during review of the BBCS if determined necessary by Halliburton. Although it is only practical to periodically revise or update the BBCS, the quality control component will be an ongoing process. Daily observations,

internal operating procedures, personnel input, and new technologies will be applied to assessments during the periodic reviews of the BBCS. As Halliburton discovers action items or other issues that need to be addressed through the quality control procedures, they will apply the appropriate adaptive management to adjust this BBCS. These adjustments and revisions will strengthen the BBCS and the measures contained therein. Revisions and updates to the BBCS will be made in consultation with the USFWS, BLM, and NDOW. Revisions and updates to the BBCS will be addressed with personnel at the Rossi Mine.

7.8 PUBLIC AWARENESS

A public awareness program can be an integral part of a BBCS. This program can be used to enhance general public awareness and support for a project's BBCS. It allows stakeholders such as government agencies, Tribes, non-profit organizations, wildlife rehabilitators, and other interested parties an opportunity to provide input to the decision-making process, enabling all parties to work openly and collaboratively toward recommendations that can be effectively implemented. This collaboration often leads to improved relationships within the community and to more efficient and positive projects. The relationships developed through this process may also encourage the public to report bird and bat mortalities and encourage them to seek assistance for birds and bats that have been injured in project-related accidents (APLIC and USFWS, 2005).

Halliburton will include bird and bat protection in its ongoing public awareness campaign. Ongoing public awareness will include Halliburton's cooperative and innovative efforts to minimize bird and bat mortality, monitoring the effectiveness of the BBCS, and ongoing monitoring to detect problem areas.

7.9 KEY RESOURCES

Halliburton will consult with the following key resources to assist in providing expertise in permitting, bird and bat populations and behavior, and avian- and bat-safe design features.

- United States Fish and Wildlife Service
  Division of Migratory Birds: http://www.fws.gov/migratorybirds/ContactUs.htm

  Contacts: http://www.fws.gov/migratorybirds/ContactUs.html

  Bird Fatality/Injury Reporting Program – For Use by Electric Utility Industry:
  https://birdreport.fws.gov/

  Migratory Bird Permits, 50CFR21:
  http://access.gpo.gov/nara/cfr/waisidx_03/50cfr21_03.html

  Eagle Permits, 50CFR22: http://access.gpo.gov/nara/cfr/waisidx_03/50cfr22_03.html

- Nevada Department of Wildlife
  Eastern Region Mining Biologist, Elko: (775) 777-2368

  Quarterly Wildlife Mortality Reporting Form (NDOW will update specific to this project):
  http://www.ndow.org/uploadedFiles/ndoworg/Content/public_documents/Forms_and_Resources/Special_Permits/Blankmortform.pdf

- Bureau of Land Management
  Elko District Office, Tuscarora Field Office: (775)753-0200

- Great Basin Bird Observatory
  http://www.gbbo.org/about_contact.html

- Western Bat Working Group
  http://www.wbwg.org/

- Avian Power Line Interaction Committee
  http://www.aplic.org/mission.php

These resources will be utilized as necessary and will further ensure that Halliburton has a successful and effective BBCS. Resources other than those listed may also be consulted, including consultants, company specialists, and other facilities and entities with proven effective bird and bat protection programs.

8.0 BIRD AND BAT REPORTING SYSTEM

8.1 PURPOSE OF THE BIRD AND BAT REPORTING SYSTEM

In order to assess the effectiveness of the BBCS and prioritize bird and bat protection needs, Halliburton will report, monitor, and manage all bird and bat injury or mortality in accordance with the methodology below. All appropriate Halliburton personnel, including managers, supervisors, crews, and engineers will be provided with instruction on implementing the methodology and properly reporting bird and bat mortality. The reporting of bird and bat mortality will be standard practice by Halliburton for the duration of the project. Reporting of avian nesting sites will also be performed according to the methodology below.

8.2 BIRD AND BAT MORTALITY REPORTING SYSTEM COMPONENTS

8.2.1 Detection

Bird and bat injury or mortality will be detected through monitoring efforts during operation and through incidental observations by Halliburton personnel or others. To improve the probability that birds or bats that have suffered injury or death do not go undetected, Halliburton field staff will be directed to remain alert for birds and bats within and near the expansion boundary. The detection of avian nest sites will occur through monitoring efforts during operation and through incidental observations.

8.2.2 Response and Documentation to Injured, Deceased, and Nesting Birds

In the event that an avian or bat injury or mortality is detected through monitoring efforts or incidental observations, Halliburton personnel will record the circumstances and conditions associated with the death or injury. Among the information recorded will be the date and time that the bird or bat was detected, the Global Positioning System location (NAD 83 datum) where the bird or bat was detected, the apparent cause of injury or mortality, and if possible, the species of the bird or bat. Halliburton personnel will be provided with a standardized Wildlife Mortality Report Form for recording the necessary information when an incident is detected. An example form is provided in Appendix A. Information on the species that may be encountered will be provided by Halliburton to its employees to aid identification.

In the event that an avian nesting site is observed within the expansion boundary through monitoring or incidental observations, Halliburton personnel will record the circumstances and conditions associated with the nest site and nest on the form provided in Appendix A.

8.2.3 Remedial Action

While there are no legal provisions for an unauthorized take of protected species, the USFWS recognizes that some avian species may be killed even after all reasonable measures to avoid a

take are implemented. Based upon the information gathered from site investigations and reported on Avian Incident Forms (Appendix A), Halliburton will, in consultation with the USFWS and NDOW, determine whether implementation of remedial protection measures is warranted. This determination will be dependent on the frequency of incident occurrences at a particular facility, the species that suffered mortality, the likely effectiveness of remedial actions, and agency input and guidance. Likewise, these same factors will determine what types of remedial protection measures and practices Halliburton will implement if such measures are determined necessary.

8.2.4 Reporting

Halliburton's Environmental Representative will complete and submit a Wildlife Mortality Report Form (Appendix A) to NDOW within 24 hours of a mortality. Although this form will be for NDOW submittal, it will be used for mortality monitoring at the site and will be available to regulatory agencies should data be requested. Halliburton's Environmental Representative will also complete the USFWS's online "Bird Fatality/Injury Report," an online database of voluntarily submitted incidents of bird mortalities and injuries resulting from electrocutions or collisions with utility structures. While this form is typically used for utility structures, it may be adapted for this project unless USFWS indicates otherwise. The intent of the database is to gain information that can be used to prevent future avian mortality. Halliburton will inform the USFWS and NDOW immediately, both verbally and in writing, of any bird or bat mortality or injury within 24 hours and coordinate to preserve and handle mortalities.

Mortality of a bald or golden eagle will be immediately reported to the USFWS, BLM, and NDOW. Any other avian nesting or bird and bat mortality data reported in the area by persons not employed by Halliburton will be recorded by Halliburton in the USFWS online database as well.

8.2.5 Disposal Procedures for Injured and Deceased Birds and Bats

The USFWS issues permits to take, possess, or transport bald and golden eagles under the BGEPA. Considering that mortality of a golden or bald eagle is unlikely to result from the project, especially after implementation of the mitigation measures described in this BBCS, the need for a take permit under the BGEPA is not warranted at this time. Halliburton personnel are strictly prohibited from handling, transporting, or disposing of a golden or bald eagle carcass without a permit issued under the BGEPA. As a result, in the unlikely event that such mortality does occur, Halliburton will contact the USFWS and NDOW immediately to report the incident and arrange for retrieval and receipt of the carcass. The BLM will also be notified of the mortality. In the event that an eagle mortality occurs, Halliburton will conduct a Resource Equivalency Analysis and meet with the agencies to determine appropriate compensatory mitigation and to determine if further avoidance measures should be implemented.

Under the MBTA, it is unlawful to collect, salvage, or otherwise have in possession any raptor or raptor part, including feathers, without a state and federal permit. Most other avian species with potential to occur in the expansion boundary, including those that are not raptors, are protected under the MBTA as well. There may be occasion however, for Halliburton or

appointed biologists to collect bird carcasses in order to determine the cause of death, for disposal purposes, or for temporary collection for on-site inspection. If such occasion becomes necessary, Halliburton will coordinate with the USFWS, BLM, and NDOW to determine the need for a permit and, if necessary, will apply for permits to allow the handling of dead and injured birds.

Halliburton will not collect any bird (as a whole or part thereof) without written approval from USFWS and NDOW. Halliburton will immediately notify the USFWS and the NDOW regarding any apparent injury or death occurring to an eagle during project activities. Halliburton will ensure that any injured eagle will be immediately transported to the nearest federally permitted eagle rehabilitator. Dead eagles will be reported to the USFWS Division of Migratory Bird Management and Law Enforcement within 48 hours and if collected by the USFWS or a permitted individual, shipped to the eagle repository in Colorado. A Migratory Bird Salvage permit maybe required. An incidental tcke permit as well as potentially a nest take permit may be required for this project, as noted below. The salvage and shipment of eagles will be included in the permit and could be handled by Halliburton or appointed biologists.

Some of the bat species with potential to occur in the expansion boundary are considered BLM sensitive species in the state of Nevada. Several of the species are also classified as protected by the State of Nevada. In the event that a bat sustains injury or experience death as a result of project machinery, Halliburton or Halliburton-appointed biologists may need to handle, transport, or dispose of bat carcasses. If the need for such actions becomes apparent, Halliburton will coordinate with the BLM and NDOW to ensure that if any permits are necessary and are obtained and that all activities are in accordance with applicable regulations and laws.

Any collection of dead or injured birds or bats has the potential for the spread of zoonotic diseases (e.g. rabies). Personal protective equipment will be used before handling any injured or dead species.

9.0 MITIGATION AND ADAPTIVE MANAGEMENT

Specific mitigation measures for impacts to bird and bat species resulting from the project have not been specified; however, the USFWS, BLM, and NDOW will contribute to accessing site-specific mitigation, should it be warranted.

Over the course of operation and maintenance of the project, Halliburton's Environmental Specialist will gather, review, and report the monitoring data from site investigations and any mortality reports resulting from structures that are found to create avian or bat mortality issues. The information received from the monitoring data will be used to prioritize, in collaboration with the agencies, future changes in monitoring and addressing potentially problematic areas and/or structures. Halliburton understands that ensuring the protection of bird and bat species as this project progresses from year-to-year will be a dynamic process that may require different techniques and approaches to reduce bird and bat mortality. Close coordination with the agencies will be important in managing and adapting this plan to future conditions.

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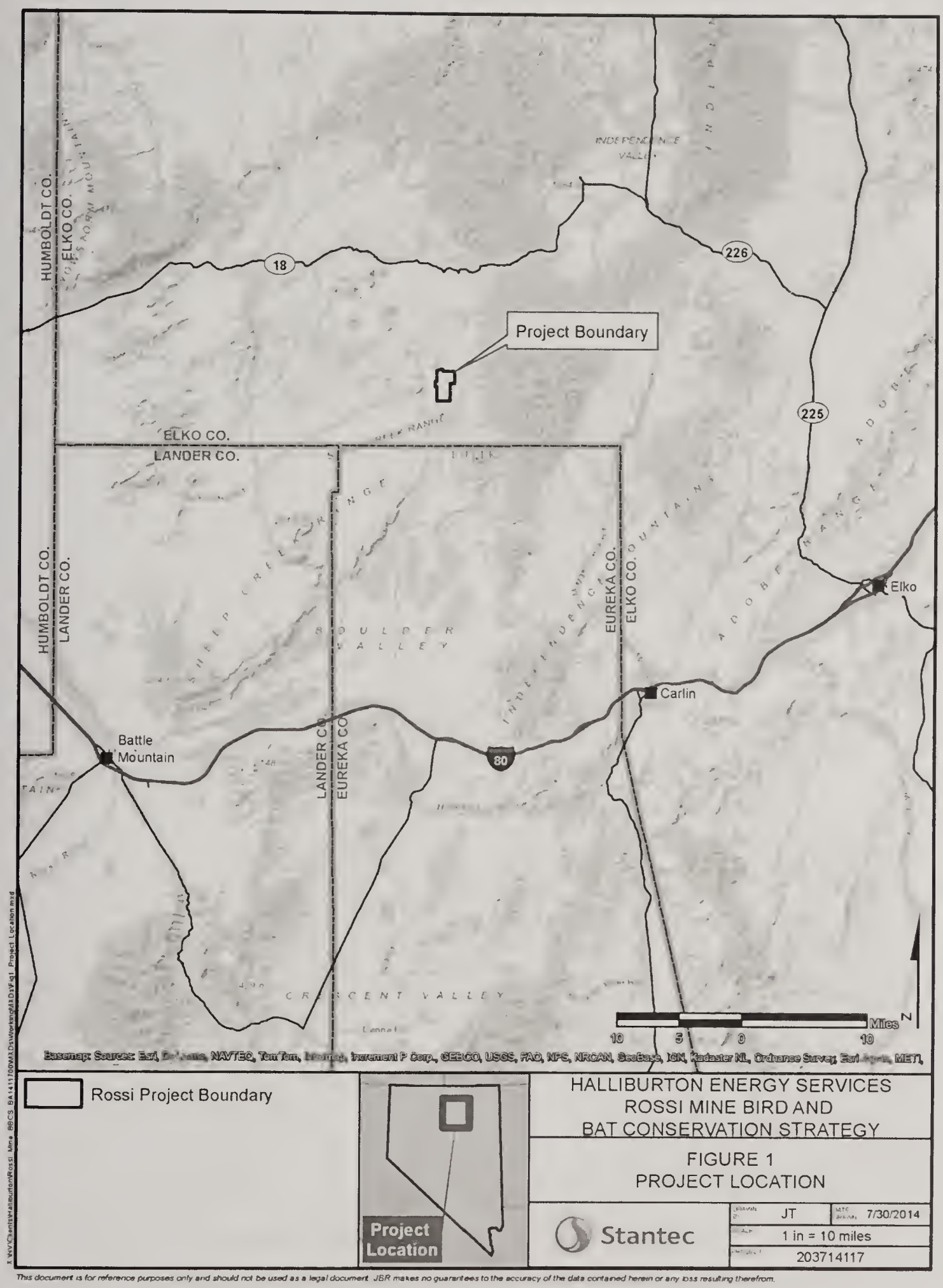
FIGURES



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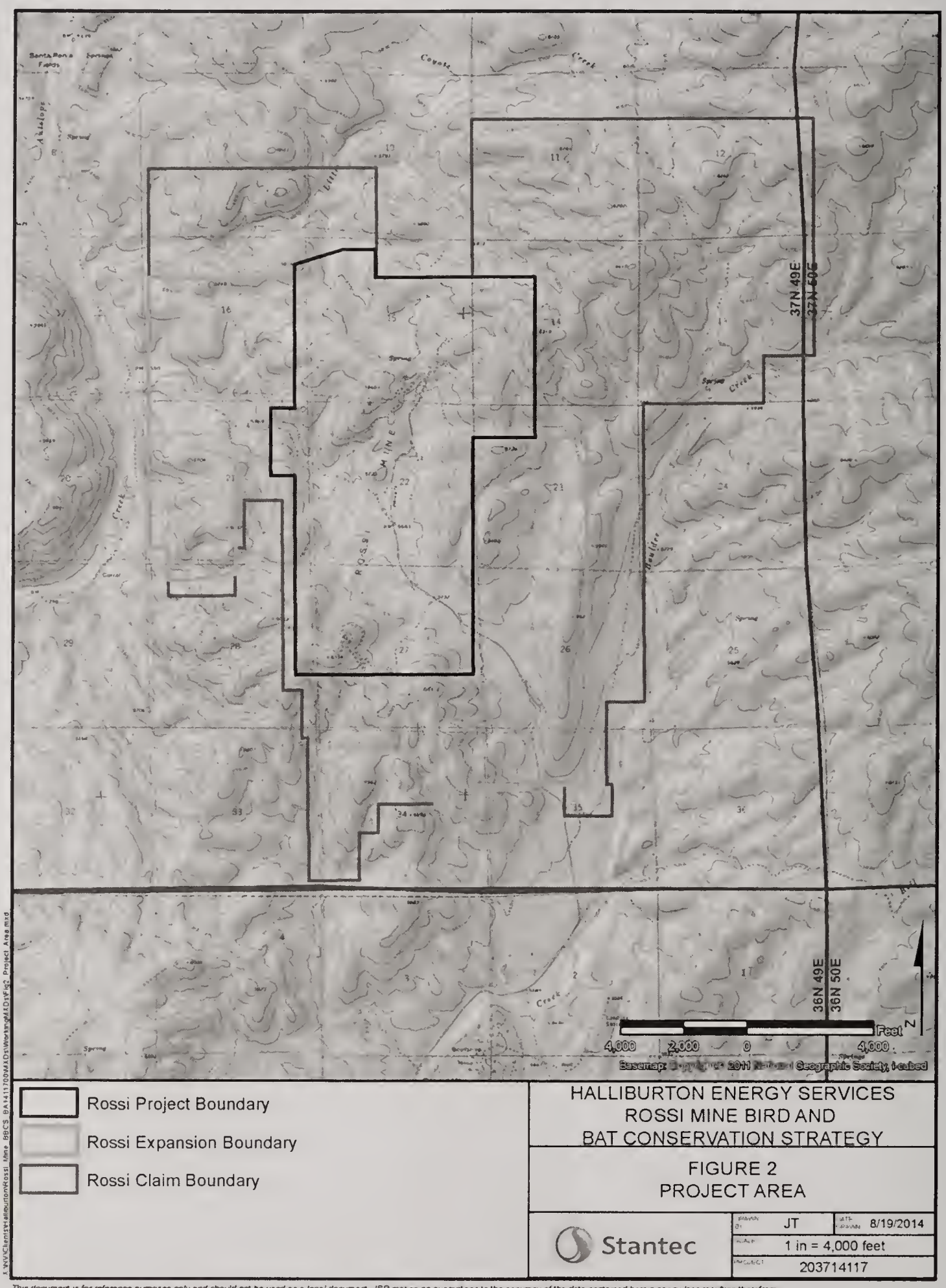
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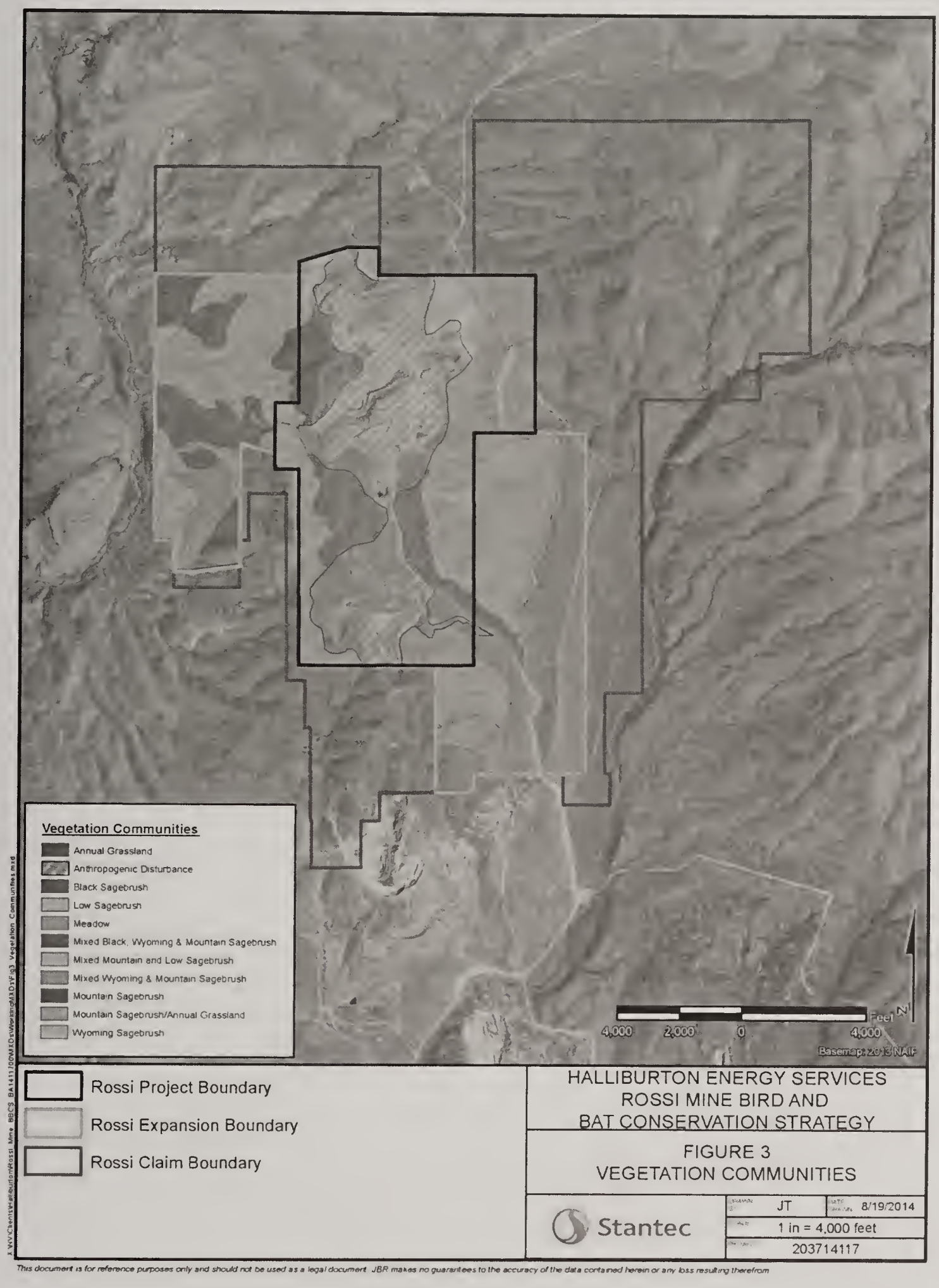
Basemap: Copyright © 2011 National Geographic Society, i-cubed
Rossi Project Boundary
Rossi Expansion Boundary
Rossi Claim Boundary
HALLIBURTON ENERGY SERVICES
ROSSI MINE BIRD AND
BAT CONSERVATION STRATEGY
FIGURE 2
PROJECT AREA
Stantec
JT
8/19/2014
1 in = 4,000 feet
203714117
This document is for reference purposes only and should not be used as a legal document. JBR makes no guarantees to the accuracy of the data contained herein or any loss resulting therefrom.


Vegetation Communities
Annual Grassland
Anthropogenic Disturbance
Black Sagebrush
Low Sagebrush
Meadow
Mixed Black, Wyoming & Mountain Sagebrush
Mixed Mountain and Low Sagebrush
Mixed Wyoming & Mountain Sagebrush
Mountain Sagebrush
Mountain Sagebrush/Annual Grassland
Wyoming Sagebrush
4,000
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4,000
Feet
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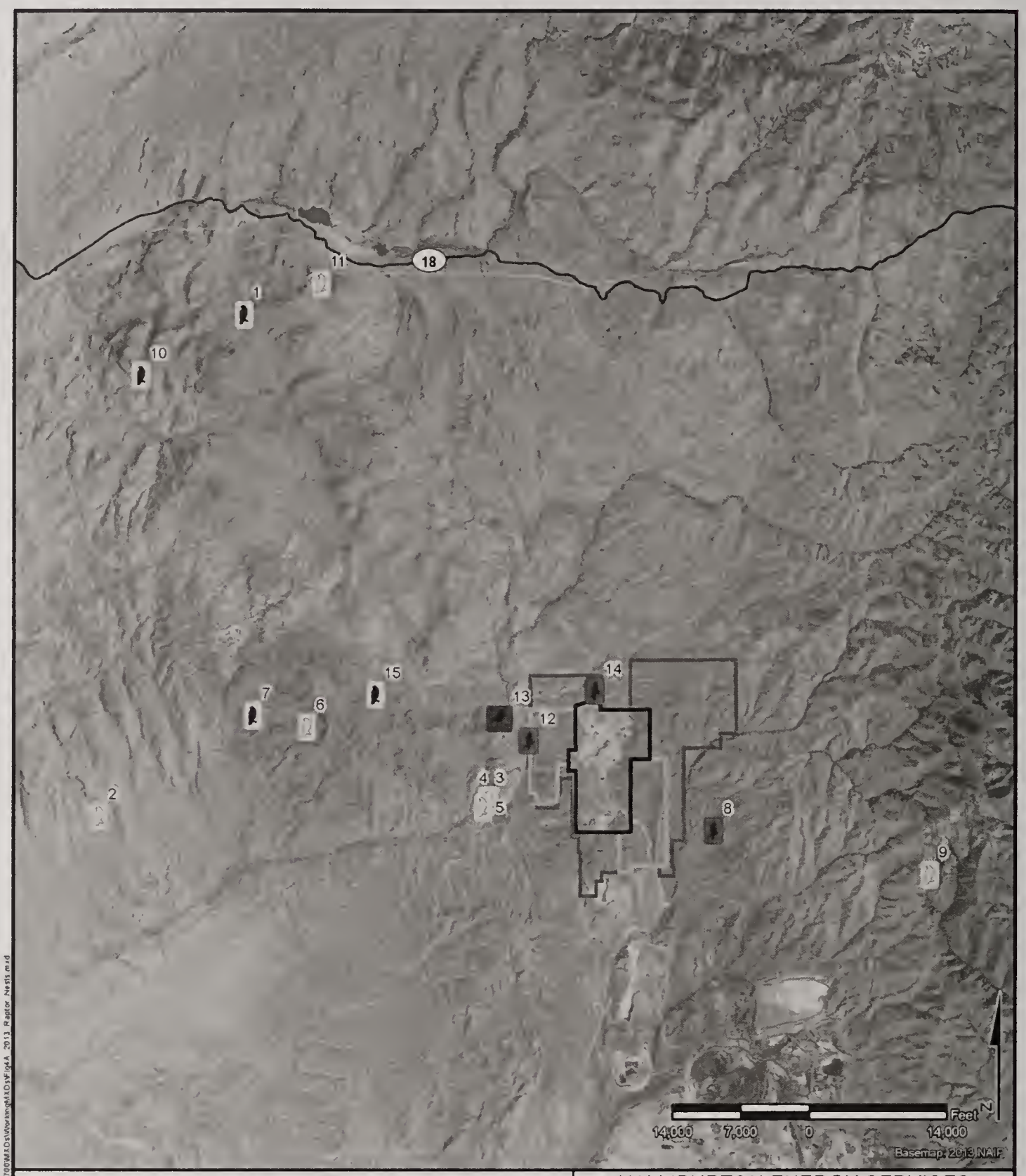
Basemap: 2013 NAIP
Rossi Project Boundary
Rossi Expansion Boundary
Rossi Claim Boundary
HALLIBURTON ENERGY SERVICES
ROSSI MINE BIRD AND
BAT CONSERVATION STRATEGY
FIGURE 3
VEGETATION COMMUNITIES
Stantec
JT
8/19/2014
1 in = 4,000 feet
203714117
This document is for reference purposes only and should not be used as a legal document. JBR makes no guarantees to the accuracy of the data contained herein or any loss resulting therefrom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Basemap: 2013 NAIP
Rossi Project Boundary
Rossi Expansion Boundary
Rossi Claim Boundary
Golden Eagle, Active (4)
Golden Eagle, Inactive (7)
Red-tailed Hawk, Active (3)
Common Raven, Active (1)
HALLIBURTON ENERGY SERVICES
ROSSI MINE BIRD AND
BAT CONSERVATION STRATEGY
FIGURE 4A
RAPTOR NEST LOCATIONS, 2013 STATUS
Stantec
JT
8/19/2014
1 in = 14,000 feet
203714117
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18
1
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15
Feet
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14,000
Basemap: 2013 NAIP
N
Rossi Project Boundary
Rossi Expansion Boundary
Rossi Claim Boundary
Golden Eagle, Active (4)
Golden Eagle, Inactive (7)
Red-tailed Hawk, Active (2)
Red-tailed Hawk, Inactive (1)
Common Raven, Active (1)
HALLIBURTON ENERGY SERVICES
ROSSI MINE BIRD AND
BAT CONSERVATION STRATEGY
FIGURE 4B
RAPTOR NEST LOCATIONS, 2014 STATUS
Stantec
DRAWN JT
DATE 8/19/2014
1 in = 14,000 feet
203714117
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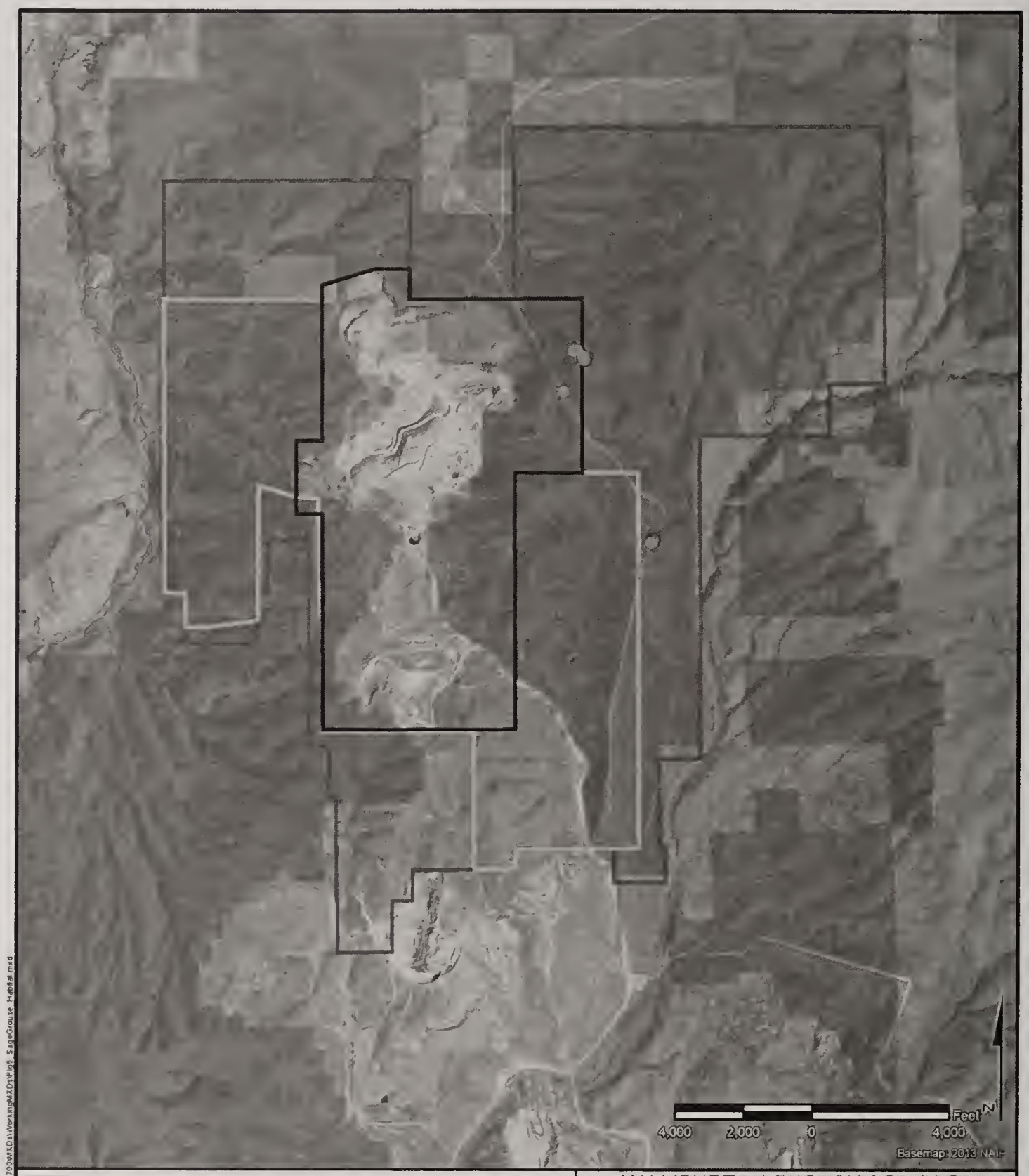

Rossi Project Boundary
Rossi Expansion Boundary
Rossi Claim Boundary
Sage-grouse Scat Locations (19)

BLM Greater Sage-grouse Habitat

Preliminary General Habitat (PGH)
Preliminary Priority Habitat (PPH)

HALLIBURTON ENERGY SERVICES
ROSSI MINE BIRD AND
BAT CONSERVATION STRATEGY

FIGURE 5
GREATER SAGE-GROUSE HABITAT

Stantec

DRAWN BY	JT
DATE	8/19/2014
SCALE	1 in = 4,000 feet
PROJECT	203714117

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4,000
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Feet
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Basemap: 2013 NAIP
Rossi Project Boundary
Rossi Expansion Boundary
Rossi Claim Boundary
Bat Survey Locations (24)
HALLIBURTON ENERGY SERVICES
ROSSI MINE BIRD AND
BAT CONSERVATION STRATEGY
FIGURE 6
BAT SURVEY LOCATIONS
Stantec
JT
8/19/2014
1 In = 4,000 feet
203714117
X:\NV\Clients\Halliburton\Rossi Mine BEC\3_BA\1\1\100\MXD\Working\MXD\Fig6_Bat_Surveys.mxd
This document is for reference purposes only and should not be used as a legal document. JBR makes no guarantees to the accuracy of the data contained herein or any loss resulting therefrom

APPENDIX A

Avian Incident and Nest Assessment Forms

NEVADA DEPARTMENT OF WILDLIFE ◆ HABITAT BUREAU

Industrial Artificial Pond Permit · Quarterly Wildlife Mortality Report Form

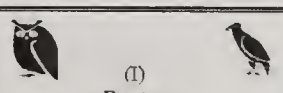
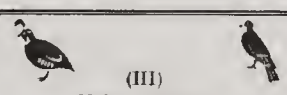
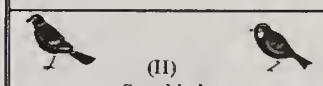
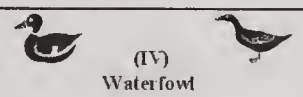
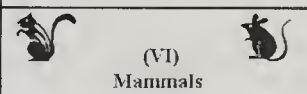
Project Title: _____ Permit #: _____

Address: _____ County: _____

City: _____ State: _____ Zip: _____

Mine ID #_____ Report Year: _____ Quarter: Jan – Mar ☐ Apr – Jun ☐ Jul – Sep ☐ Oct – Dec ☐

Wildlife Mortality Identification

 (I) Raptors	 (III) Upland Game	 (V) Shorebirds
 (II) Songbirds	 (IV) Waterfowl	 (VI) Mammals

Please list number and species under each category (DO NOT leave blank)

Example:

RAPTOR (I)	0
SONGBIRD (II)	1 sparrow, 2 wren
UPLAND GAME (III)	1 quail
WATERFOWL (IV)	3 mallard, 1 bufflehead, 4 gadwall
SHOREBIRD (V)	0
MAMMAL (VI)	4 mice, 2 skunk, 1 ground squirrel
OTHER	2 lizards, 1 rattlesnake

Mortalities Associated <u>with</u> Permitted Pond Solutions or Structures

	Number and Species Identification (DO NOT leave blank)
RAPTOR (I)	_____
SONGBIRD (II)	_____
UPLAND GAME (III)	_____
WATERFOWL (IV)	_____
SHOREBIRD (V)	_____
MAMMAL (VI)	_____
OTHER	_____

(Report Mortalities NOT Associated with Permitted Pond Solutions or Structures on Back of Form)

REPORTER: _____ DATE: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____ PHONE: _____

STATE OF NEVADA - DEPARTMENT OF WILDLIFE REV 09/03 PAGE 1 OF 2

Mortalities Not Associated with Permitted Pond Solutions or Structures

	Number And Species Identification (DO NOT leave blank)
RAPTOR (I)	_____
SONGBIRD (II)	_____
UPLAND GAME (III)	_____
WATERFOWL (IV)	_____
SHOREBIRD (V)	_____
MAMMAL (VI)	_____
OTHER	_____

(Report Mortalities Associated with Permitted Pond Solutions or Structures On Front Of Form)

Remarks:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Please comment on any circumstances which you feel may be important, particularly when you feel one or more mortalities may have occurred under unusual conditions.

Please submit form to the appropriate regional office listed below:

WESTERN REGION
NEVADA DEPARTMENT OF WILDLIFE
WESTERN REGION MINING BIOLOGIST
1100 VALLEY ROAD; RENO NV 89512
TELEPHONE: (775) 688-1500
COUNTIES: CARSON CITY, CHURCHILL, DOUGLAS, HUMBOLDT, LYON, MINERAL, PERSHING, STOREY, WASHOE

SOUTHERN REGION
NEVADA DEPARTMENT OF WILDLIFE
SOUTHERN REGION MINING BIOLOGIST
P O BOX 1032; TONOPAH NV 89049
TELEPHONE: (775) 482-3153
COUNTIES: CLARK, ESMERALDA, LINCOLN, NYE

EASTERN REGION
NEVADA DEPARTMENT OF WILDLIFE
EASTERN REGION MINING BIOLOGIST
60 YOUTH CENTER ROAD, ELKO, NV 89801
TELEPHONE: (775) 777-2300
COUNTIES: ELKO, EUREKA, LANDER, WHITE PINE

STATE OF NEVADA – DEPARTMENT OF WILDLIFE REV. 09/03 PAGE 2 OF 2

Example 7. Dead bird/nest reporting form. This form can be used in conjunction with the Bird Mortality Tracking System software available from APLIC.

Dead Bird/Nest Form

Operations Area:

Dead Bird (circle one)		**or**	**Nest (circle one)**
Crow/magpie/raven	Eagle		Active
Hawk/falcon/osprey	Owl		Inactive
Small bird (protected)	Waterfowl		
Unknown species			

Bird Count_____

Date Found_____ **Time Found**_____

Sign of Death (circle one)

Collision	Electrocution	Shot	Unknown

County_____

Finder's Name_____

Finder's Phone_____

Line Name/Circuit No._____

Pole Identification No._____

Recommended Action (circle)

Dead Bird Actions	*Nest Actions*
Cover transformer equipment	Install nest platform
Install insulator cover(s)	Relocate nest
Install triangle(s)	Trim nest
Reframe structure	Install nest guards
Replace structure	Remove nest
Remove pole	Evaluate to determine appropriate action
De-energize	No action

Install bird flight diverters/fireflies
Evaluate to determine appropriate action (Provide action in comments)
Continue to monitor line (Justification required)
No action (Justification required)

Comments_____

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ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX G

LANDS WITH WILDERNESS CHARACTERISTICS DOCUMENTATION FORMS

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FORM 1

DOCUMENTATION OF BLM WILDERNESS INVENTORY FINDINGS FROM PREVIOUS INVENTORY ON RECORD:

1. **Is there existing BLM wilderness inventory information on all or part of this Unit?**

No _____(Go to Form 2) Yes _X__ (if yes, and more than one area is within the area, list the name of those areas.):

a) Inventory Source: 1979 Initial Wilderness Inventory

b) Inventory Area Unique Identifier(s): NV-010-123 Bootstrap

c) Map Name(s)/Number(s) Bootstrap Inventory Unit NV-010-123; Tuscarora 1:100,000

g) BLM District(s)/Field Office(s): Elko District/Tuscarora Field Office

2. BLM Inventory Findings on Record:

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory unit is associated with the area, list each unit and answer each question individually for each inventory unit):
Inventory Source: 1979 Initial Wilderness Inventory

Area Unique Identifier	Sufficient Size? Yes/No (acres)	Natural Condition? Y/N	Outstanding Solitude? Y/N	Outstanding Primitive & Unconfined Recreation? Y/N	Supplemental Values? Y/N
NV-010-123A	Y	N	N	N	N

1

FORM 2

Current Conditions: Presence or Absence of Wilderness Characteristics
Rossi Mine Area 3

a. Area Unique Identifier : NV-010-123A Acreage: 5,800
(If the inventory area consists of subunits, list the acreage of each and evaluate each separately).

In completing steps (1)-(5), use additional space as necessary.

(1) Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check "Yes" and describe the exception in the space provided below),

Yes _X_ No _____

Note: If "No" is checked the area does not have wilderness characteristics; check "NA" for the remaining questions below.

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

NV-010-123A is a sub-unit of NV-010-123 Bootstrap due to a transmission line ROW this unit was parceled off to reflect the current conditions. NV-010-123A is bound by the BLM route 1227 Rossi Mine Road to the north and BLM route 1139 Antelope Creek Road to the west. The area is generally almond shaped with a small section of private property (36 acres) near the northeast portion of the unit.

(2) Does the area appear to be natural?

Yes____ No _X_ N/A_____
Note: If "No" is checked the area does not have wilderness characteristics; check "NA" for the remaining questions below.

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

NV-010-123A is composed of land managed by the BLM with one small private inholding. The inventory unit is approximately 45 miles northwest of Elko, NV and 25 miles northeast of Dunphy, NV and is mainly accessed from I-80 then either thru the Rossi Mine Road 1227, Squaw Creek Road 1059 or Antelope Creek Road 1139. Topography is undulating hills with the dominant forms of vegetation being a mosaic of sagebrush species or saltbush-greasewood shrublands and salt flats. Occasional associated scrubs include twisted rabbitbrush, smooth horsebrush, prickly phox and service berry. Mining continues to the main use of the area besides some grazing and limited dispersed recreation. Major human activities are located inside the inventory due to all of the mining operations taking place over the last 50 plus years. Modern structures and ground disturbances are readily visible from a majority of the areas of this unit and greatly impact the natural fee of the area.

(3) Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes _____ No _____ N/A __X_____

Description (describe the area's outstanding opportunities for solitude):

_____
_____
_____
_____
_____
_____

(4) Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?

Yes _____ No _____ N/A _X_____

Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "NA" for question 5.

Description (describe the area's outstanding opportunities for primitive and unconfined recreation): _____

_____
_____
_____
_____
_____

(5) Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A __X_____

Description: _____

_____
_____
_____
_____
_____

Summary of Analysis•

Area Unique Identifier: NV-010-123A

Rossi Mine Area 3

Summary

Results of analysis:

NV-010-123A was found to lack sufficient wilderness characteristics. Condition of this latest inventory are consistent with the 1979 Initial Wilderness Inventory report as activities as well as terrain and vegetation features within the unit remain relatively unchanged from the previous analysis. Anthropogenic disturbances continue to revolve around mining, ranching and dispersed recreation activities. One item to note is the expansion of the mining operations including utility line rights of ways within the inventory unit from the previous analysis which only serve to diminish the wilderness character not enhance those opportunities.

(Note: explain the inventory findings for the entirety of the inventory unit. When wilderness characteristics have been identified in an area that is smaller than the size of the total inventory unit, explain why certain portions of the inventory unit are not included within the lands with wilderness characteristics (e.g. the inventory found that certain parts lacked naturalness).

Does the area meet any of the size requirements? __X__ **Yes** ___ **No**

Does the area appear to be natural? ___ **Yes** __X__ **No** ___ **N/A**

Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation? ___ Yes ___ **No** __X__ **N/A**

Does the area have supplemental values? ___ **Yes** ___ **No** __X__ **N/A**

Check one:

___ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

__X__ The area does not have wilderness characteristics.

Prepared by (team members):

Mike Setlock, Outdoor Recreation Planner, 08/31/16

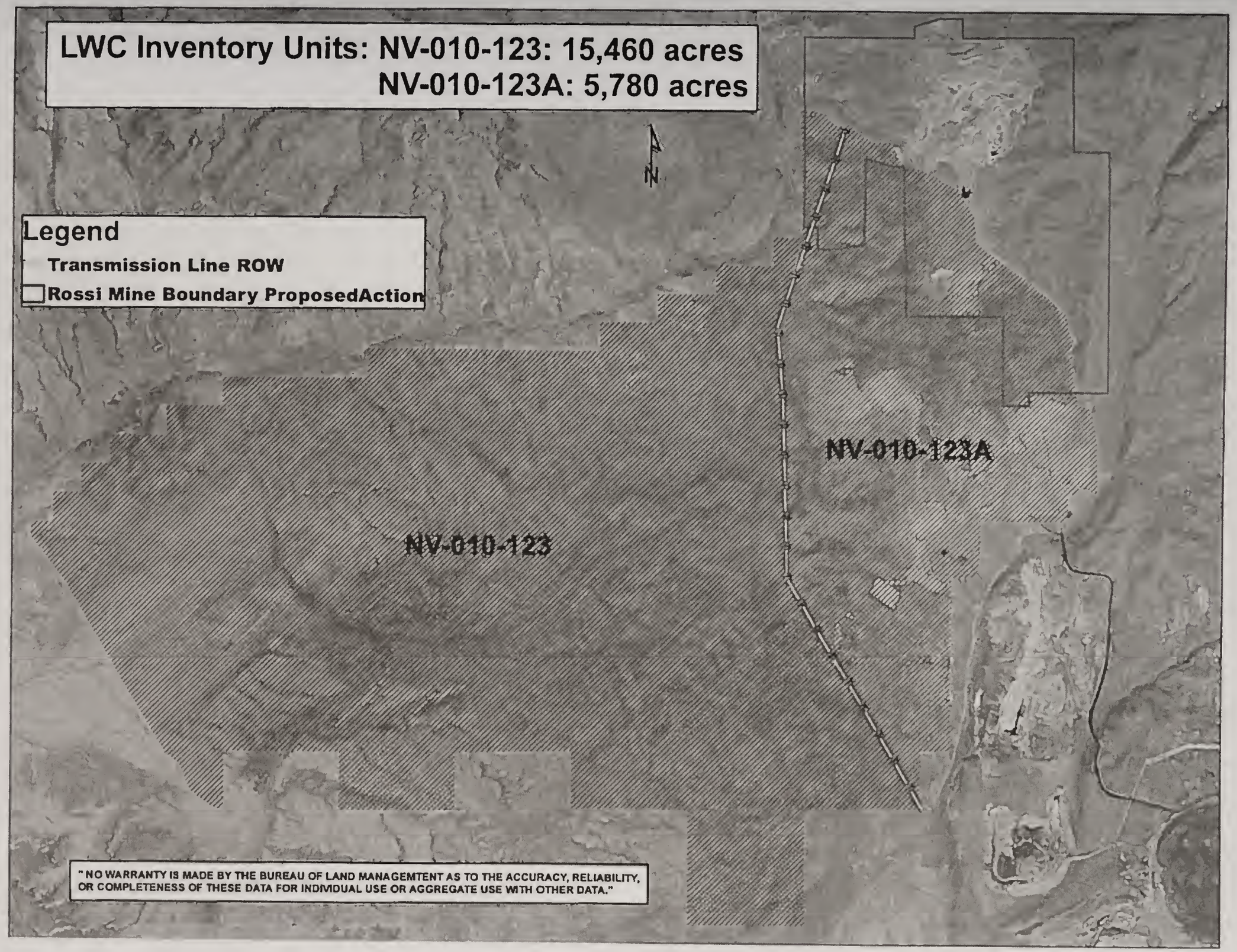
(Name, Title, Date)

Reviewed by (District or Field Manager):

Name: [signature] **Title:** Field Manager

Date: 9/7/16

• This form documents information that constitutes an inventory finding on wilderness characteristics. It does not represent a formal land use allocation or a final agency decision subject to administrative remedies under either 43 CFR parts 4 or 1610.5-3.


LWC Inventory Units: NV-010-123: 15,460 acres
NV-010-123A: 5,780 acres
N
Legend
Transmission Line ROW
Rossi Mine Boundary ProposedAction
NV-010-123A
NV-010-123
"NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMTENT AS TO THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THESE DATA FOR INDIVIDUAL USE OR AGGREGATE USE WITH OTHER DATA."

FORM 1

DOCUMENTATION OF BLM WILDERNESS INVENTORY FINDINGS FROM PREVIOUS INVENTORY ON RECORD:

1. Is there existing BLM wilderness inventory information on all or part of this Unit?

No _____(Go to Form 2) Yes _X_ (if yes, and more than one area is within the area, list the name of those areas.):

a) Inventory Source: 1979 Initial Wilderness Inventory

b) Inventory Area Unique Identifier(s): NV-010-211 Wilson

c) Map Name(s)/Number(s) Bootstrap Inventory Unit NV-010-211; Tuscarora 1:100,000

g) BLM District(s)/Field Office(s): Elko District/Tuscarora Field Office

2. BLM Inventory Findings on Record:

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory unit is associated with the area, list each unit and answer each question individually for each inventory unit):
Inventory Source: 1979 Initial Wilderness Inventory

Area Unique Identifier	Sufficient Size? Yes/No (acres)	Natural Condition? Y/N	Outstanding Solitude? Y/N	Outstanding Primitive & Unconfined Recreation? Y/N	Supplemental Values? Y/N
NV-010-211A	N	N	N	N	N
NV-010-211B	N	N	N	N	N

1

FORM 2

Current Conditions: Presence or Absence of Wilderness Characteristics

a. Area Unique Identifier : NV-010-211A Acreage: 4,200
(If the inventory area consists of subunits, list the acreage of each and evaluate each separately).

In completing steps (1)-(5), use additional space as necessary.

(1) Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check "Yes" and describe the exception in the space provided below),

Yes _____ No X___

Note: If "No" is checked the area does not have wilderness characteristics; check "NA" for the remaining questions below.

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

NV-010-211A is a sub-unit of the eastside of NV-010-211 Wilson due to BLM Road Squaw Creek 1059 this unit was parceled off to reflect the current conditions. NV-010-211A is bound by the BLM route 1227 Rossi Mine Road to the south and BLM route 1139 Antelope Creek Road to the west. The area is generally square shaped with several sections of private property (360 acres) near the center portion of the unit.

(2) Does the area appear to be natural?

Yes_____ No _____ N/A___X____
Note: If "No" is checked the area does not have wilderness characteristics; check "NA" for the remaining questions below.

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

NV-010-211A is composed of land managed by the BLM with five private inholdings. These five inholdings are approximately 76, 40, 150, 73 and 21 acres in size and total 360 acres. The inventory unit is approximately 45 miles northwest of Elko, NV and 25 miles northeast of Dunphy, NV and is mainly accessed from I-80 then either thru the Rossi Mine Road 1227, Squaw Creek Road 1059 or Antelope Creek Road 1139. Topography is undulating hills with the dominant forms of vegetation being a mosaic of sagebrush species or saltbush-greasewood shrublands and salt flats. Occasional associated scrubs include twisted rabbitbrush, smooth horsebrush, prickly phox and service berry. Mining continues to the main use of the area besides some grazing and limited dispersed recreation. Major human activities are located inside the inventory due to all of the mining operations taking place over the last 50 plus years. Modern

structures and ground disturbances (utility lines) are readily visible from a majority of the areas of this unit and greatly impact the natural fee of the area.

(3) Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes _____ No _____ N/A __X_____

Description (describe the area's outstanding opportunities for solitude):

_____
_____
_____
_____
_____
_____

(4) Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?

Yes _____ No _____ N/A _X_____

Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "NA" for question 5.

Description (describe the area's outstanding opportunities for primitive and unconfined recreation): _____
_____
_____
_____
_____
_____

(5) Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A __X_____

Description: _____
_____
_____
_____
_____
_____

Summary of Analysis•

Area Unique Identifier: NV-010-211A

Rossi Mine Area 1

Summary

Results of analysis:

NV-010-211A was found to lack sufficient wilderness characteristics. Condition of this latest inventory are consistent with the 1979 Initial Wilderness Inventory report as activities as well as terrain and vegetation features within the majority of the unit remain relatively unchanged from the previous analysis. This unit lacks the sufficient size requirement of 5,000 acres of continuous BLM. One item to note is the expansion of the mining operations including utility line rights of ways within the inventory unit from the previous analysis which only serve to diminish the wilderness character not enhance those opportunities.

(Note: explain the inventory findings for the entirety of the inventory unit. When wilderness characteristics have been identified in an area that is smaller than the size of the total inventory unit, explain why certain portions of the inventory unit are not included within the lands with wilderness characteristics (e.g. the inventory found that certain parts lacked naturalness).

Does the area meet any of the size requirements? ___ **Yes** __X__ **No**

Does the area appear to be natural? ___ **Yes** __X__ **No** ___ **N/A**

Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation? ___ Yes ___ **No** __X__ **N/A**

Does the area have supplemental values? ___ **Yes** ___ **No** __X__ **N/A**

Check one:

___ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

__X__ The area does not have wilderness characteristics.

Prepared by (team members):

Mike Setlock, Outdoor Recreation Planner, 08/31/16

(Name, Title, Date)

Reviewed by (District or Field Manager):

Name: [signature] **Title:** Field Manag

Date: 9/7/16

• This form documents information that constitutes an inventory finding on wilderness characteristics. It does not represent a formal land use allocation or a final agency decision subject to administrative remedies under either 43 CFR parts 4 or 1610.5-3.

4

FORM 2

Current Conditions: Presence or Absence of Wilderness Characteristics
Rossi Mine Area 2

a. Area Unique Identifier : NV-010-211B Acreage: 4,780
(If the inventory area consists of subunits, list the acreage of each and evaluate each separately).

In completing steps (1)-(5), use additional space as necessary.

(1) Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check "Yes" and describe the exception in the space provided below),

Yes _____ No ___X__

Note: If "No" is checked the area does not have wilderness characteristics; check "NA" for the remaining questions below.

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

NV-010-211B is a sub-unit of the westside of NV-010-211 Wilson due to BLM Road 1059 Squaw Creek this unit was parceled off to reflect the current conditions. NV-010-211B is bound by the BLM route 1227 Rossi Mine Road to the south and BLM route 1059 Squaw Creek Road to the west. The area is generally rectangular shaped with several small sections of private property (232 acres) near the eastside of the unit.

(2) Does the area appear to be natural?

Yes___ No____ N/A____X____
Note: If "No" is checked the area does not have wilderness characteristics; check "NA" for the remaining questions below.

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

NV-010-211B is composed of land managed by the BLM with three small private inholdings. These three inholdings are approximately 38, 142 and 52 acres in size and total 232 acres. The inventory unit is approximately 45 miles northwest of Elko, NV and 25 miles northeast of Dunphy, NV and is mainly accessed from I-80 then either thru a gravel road to the south on the eastside of the unit or BLM Squaw Creek Road 1059 . Topography is undulating hills with the dominant forms of vegetation being a mosaic of sagebrush species or saltbush-greasewood shrublands and salt flats. Occasional associated scrubs include twisted rabbitbrush, smooth horsebrush, prickly phox and service berry. Grazing continues to the main use of the area besides some mining and limited dispersed recreation. Modern structures (utility lines) and ground disturbances that support mining operations are readily visible from the center of this unit and greatly impact the natural fee of the area.

(3) Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes _____ No _____ N/A __X_____

Description (describe the area's outstanding opportunities for solitude):

_____
_____
_____
_____
_____
_____

(4) Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?

Yes _____ No _____ N/A _X_____

Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "NA" for question 5.

Description (describe the area's outstanding opportunities for primitive and unconfined recreation): _____

_____
_____
_____
_____
_____

(5) Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A __X_____

Description: _____

_____
_____
_____
_____
_____

Summary of Analysis•

Area Unique Identifier: NV-010-211B

Rossi Mine Area 2

Summary
Results of analysis:

NV-010-211B was found to lack sufficient wilderness characteristics. Condition of this latest inventory are consistent with the 1979 Initial Wilderness Inventory report as activities as well as terrain and vegetation features within the unit remain relatively unchanged from the previous analysis. This unit lacks the sufficient size requirement of 5,000 acres of continuous BLM. One item to note is the addition of utility line/ROWs within the inventory unit from the previous analysis which only serve to diminish the wilderness character not enhance those opportunities. (Note: explain the inventory findings for the entirety of the inventory unit. When wilderness characteristics have been identified in an area that is smaller than the size of the total inventory unit, explain why certain portions of the inventory unit are not included within the lands with wilderness characteristics (e.g. the inventory found that certain parts lacked naturalness).

Does the area meet any of the size requirements? ___ **Yes** _X_ **No**

Does the area appear to be natural? ___ **Yes** _X_ **No** ___ **N/A**

Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation? ___ Yes ___ **No** _X_ **N/A**

Does the area have supplemental values? ___ **Yes** ___ **No** _X_ **N/A**

Check one:

___ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

_X_ The area does not have wilderness characteristics.

Prepared by (team members):

Mike Setlock, Outdoor Recreation Planner, 08/31/16

(Name, Title, Date)

Reviewed by (District or Field Manager):

Name: Melanie Setlock **Title:** Field Manager

Date: 9/7/16

• This form documents information that constitutes an inventory finding on wilderness characteristics. It does not represent a formal land use allocation or a final agency decision subject to administrative remedies under either 43 CFR parts 4 or 1610.5-3.


LWC Inventory Units:NV-010-211A: 3,840 acres
NV-010-211B: 4,548 acres
NV-010-211A
NV-010-211B
Legend
Rossi Mine Boundary ProposedAction
BLM Road 1059 Squaw Creek
Transmission Lines ROW
" NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMTENT AS TO THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THESE DATA FOR INDIVIDUAL USE OR AGGREGATE USE WITH OTHER DATA."

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ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX H

HABITAT ASSESSMENT FRAMEWORK WORKSHEETS

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Annotated Habitat Assessment Framework Worksheets

Below are Site-Scale (Fourth-Order) HAF worksheets with annotations for where to find the data from LHA plots. While there are multiple sources that contain the necessary data, these annotations are an attempt at limiting the number of sources you must use. If you have other preferred sources that are not listed here, feel free to use them, just please refer to the Where to Access LHA Data document (in the Land Health Assessment Program folder on the DFS) to verify that your choice generates accurate information.

The following annotated worksheets include:

1. **Form S-1**: Sage-Grouse Site-Scale Seasonal Habitat Data Summary
2. **Form S-3**: Sage-Grouse Site-Scale Seasonal Habitat Suitability Worksheet – Breeding Habitat (Nesting/Early Brood-Rearing)
3. **Form S-4**: Sage-Grouse Site-Scale Seasonal Habitat Suitability Worksheet – Upland Summer/Late Brood-Rearing Habitat
4. **Form S-6**: Sage-Grouse Site-Scale Seasonal Habitat Suitability Worksheet – Winter Habitat

The Geodatabase is preferred because it reports living sagebrush only, as required by the HAF. (You can calculate living sagebrush from the RD, but it is not a straight-forward process.)

A word of caution: The 2011-2014 Geodatabase uses the sage-grouse preferred forb list from 2010, which differs from the 2015 list. Species count of preferred forbs listed here may be slightly off. The 2016 version of the RD (not yet released) will provide an updated count of preferred forb species.

Sage shape data was not collected prior to 2016. However, ARTRT (basin big sage) is typically columnar, while the other sage species are typically spreading. Thus, you can use output results from the RD: LPI (Cover) [Filter Indicator Category by 'Species' and Hit Category by 'Any Hit'] to guesstimate relative abundances of the different shrub shapes.

Abbreviations:

GDB: NV LHA Geodatabase

LPI: Line-point intercept (the method used to generate percent cover and plant heights)

RD: Reporting Database (a Microsoft Access file that must be linked to the appropriate DIMA in order to generate tables; see the Step by Step Instructions for Using the AIMRD v 1.42 on the DFS for more detail)

TD: TerrADat

Questions?

Talk to Ali Helmig (x236) or Lisa Jones (x383) of GBI for assistance.

Form S-1: Sage-Grouse Site-Scale Seasonal Habitat Data Summary

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Creek
Seasonal Habitat: Winter, Nesting, Brood Rearing			Associated Leks: Little Coyote Ck 12

Land Cover Type	Ecological Site	Area (ha/ac) or Length (km/mi)	Transects (#)	Indicator Values from Data Forms (means in most cases)								
				$\overline{x}$ Sage Cover (%)	$\overline{x}$ Sage Ht. (cm)	$\overline{x}$ Predominant Sage Shape (# of S and C)	$\overline{x}$ PG Ht. (cm)	$\overline{x}$ PF Ht. (cm)	$\overline{x}$ PG Cover (%)	$\overline{x}$ PF Cover (%)	Preferred Forb Species (#)	Lek Hbt. Avg. Distance to Sage Cover (m)
Mountain Big Sage/ Idaho Fescue	DRG 25-1	.95 ha	3	3.3	50.0	C=3/5=6% S=2/5=4%	70.3	28.0	23.3	20.6		
Low sage/ Wyoming Sage/ Squirreltail	DRG 25-2	1.9 ha	6	7.7	53.6	C=5/7=71.4% S=2/7=28.6%	45.9	0.0	51.3	5.0		
Mountain Sage/ Needle and Thread	DRG 25-4	.95 ha	3	.7	85.0	C= 1/1= 100%	53.5	0.0	30.7	4.7		

Form S-3: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Breeding Habitat (Nesting/Early Brood-Rearing)

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Creek
Land Cover Type: Mountain Big Sage/Idaho Fescue			Ecological Site: DRG 25-1
Associated Leks: Little Coyote Ck 12			Number of Transects: 3
Area Sampled (ha/ac): .95 ha			Site Info.: ☑ Arid Site ☐ Mesic Site

List UTM Coordinates (coordinates, zone, datum) of All Transects:
4551860 X 555578 Zone 11 NAD 83

Habitat Indicator	$\bar{x}$	Suitable	✔	Marginal	✔	Unsuitable	✔
Sagebrush Canopy Cover (mean)	3.3	15 to 25%		5 to <15% or >25%		<5%	✓
Sagebrush Height Mesic Site (mean) Arid Site (mean)	 50.0	 40 to 80 cm 30 to 80 cm	✓	 20 to <40 cm or >80 20 to <30 cm or >80		 <20 cm <20 cm	
Predominant Sagebrush Shape (mode) Spreading (*n*) Columnar (*n*)	 2 3	Spreading		Mix of spreading and columnar		Columnar	✓
Perennial Grass Height (mean)	70.3	≥18 cm	✓	10 to <18 cm		<10 cm	
Perennial Forb Height (mean)	28.0	≥18 cm	✓	10 to <18 cm		<10 cm	
Perennial Grass Cover Mesic Site (mean) Arid Site (mean)	 0.0 23.3	 ≥15% ≥10%	✓	 5 to <15% 5 to <10%		 <5% <5%	
Perennial Forb Cover Mesic Site (mean) Arid Site (mean)	 0.0 20.6	 ≥10% ≥5%	✓	 5 to <10% 3 to <5%		 <5% <3%	
Preferred Forb Availability (relative to site potential)		Preferred forbs are common with several species present		Preferred forbs are common but only a few species are present		Preferred forbs are rare	✓
Number of Preferred Forb Species (*n*)	4						
Site-Scale Suitability		Suitable		Marginal	✓	Unsuitable	

Does ecological site potential limit suitability potential? ☐ Yes ☑ No ☐ Unknown

Drought Condition: GDB Plot Details table: Recent Weather Past 12 field ☐ Extreme Drought ☐ Severe Drought ☑ Moderate Drought ☐ Mid-Range ☐ Moderately Moist ☐ Very Moist ☐ Extremely Moist

Rationale for Overall Suitability Rating:

Preferred forbs represented 1.3% collected on LPI
In a previous burn
Sage height was not taken in the snow

Form S-4: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Upland Summer/Late Brood-Rearing Habitat

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Creek
Land Cover Type: Mountain Big Sage/Idaho Fescue			Ecological Site: DRG 25-1
Number of Transects: 3			Area Sampled (ha/ac): .95 ha

List UTM Coordinates (coordinates, zone, datum) of All Transects:

4551860 X 555578 Zone 11 NAD 83

Habitat Indicator Suitability Range							
Habitat Indicator	$\bar{x}$	**Suitable**	✔	**Marginal**	✔	**Unsuitable**	✔
Sagebrush Cover (mean)	3.3	10 to 25%		5 to <10% or >25%		<5%	✓
Sagebrush Height (mean)	50.0	40 to 80 cm	✓	20 to <40 or >80 cm		<20cm	
Perennial Grass and Forb Cover (mean)	21.95	≥15 %	✓	5 to <15%		<5%	
Preferred Forb Availability (relative to site potential)		Preferred forbs are common with appropriate numbers of species present		Forbs are common but only a few preferred species are present		Preferred forbs are rare	✓
Number of Preferred Forb Species (*n*)	4						
Site-Scale Suitability		**Suitable**		**Marginal**	✓	**Unsuitable**	

Does site potential limit suitability?		Yes	✓	No		Unknown	
Drought Condition: GDB Plot Details table: Recent Weather Past 12 field		Extreme Drought		Severe Drought	✓	Moderate Drought	Mid-Range
		Moderately Moist		Very Moist		Extremely Moist	

Rationale for Overall Suitability Rating:

Preferred forbs represented 1.3% collected on LPI
In a previous burn
Sage height was not taken in the snow

Form S-6: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Winter Habitat

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Creek
Land Cover Type: Mountain Big Sage/Idaho Fescue			Ecological Site: DRG 25-1
Number of Transects: 3			Area Sampled (ha/ac): .95 ha

List UTM Coordinates (coordinates, zone, datum) of All Transects:

4551860 X 555578 Zone 11 NAD 83

Habitat Indicator Suitability Range							
Habitat Indicator	$\bar{x}$	**Suitable**	✔	**Marginal**	✔	**Unsuitable**	✔
Sagebrush Cover (mean)	3.3	≥10 %		5 to <10%		<5%	✓
Sagebrush Height (above snow) (mean)	50.0	≥25 cm	✓	>10 to <25 cm		≤10 cm	
Site-Scale Suitability		**Suitable**		**Marginal**	✓	**Unsuitable**	

Rationale for Overall Suitability Rating:

Preferred forbs represented 1.3% collected on LPI
In a previous burn
Sage height was not taken in the snow

Annotated Habitat Assessment Framework Worksheets

Below are Site-Scale (Fourth-Order) HAF worksheets with annotations for where to find the data from LHA plots. While there are multiple sources that contain the necessary data, these annotations are an attempt at limiting the number of sources you must use. If you have other preferred sources that are not listed here, feel free to use them, just please refer to the Where to Access LHA Data document (in the Land Health Assessment Program folder on the DFS) to verify that your choice generates accurate information.

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3. **Form S-4**: Sage-Grouse Site-Scale Seasonal Habitat Suitability Worksheet – Upland Summer/Late Brood-Rearing Habitat
4. **Form S-6**: Sage-Grouse Site-Scale Seasonal Habitat Suitability Worksheet – Winter Habitat

The Geodatabase is preferred because it reports living sagebrush only, as required by the HAF. (You can calculate living sagebrush from the RD, but it is not a straight-forward process.)

A word of caution: The 2011-2014 Geodatabase uses the sage-grouse preferred forb list from 2010, which differs from the 2015 list. Species count of preferred forbs listed here may be slightly off. The 2016 version of the RD (not yet released) will provide an updated count of preferred forb species.

Sage shape data was not collected prior to 2016. However, ARTRT (basin big sage) is typically columnar, while the other sage species are typically spreading. Thus, you can use output results from the RD: LPI (Cover) [Filter Indicator Category by 'Species' and Hit Category by 'Any Hit'] to guesstimate relative abundances of the different shrub shapes.

Abbreviations:

GDB: NV LHA Geodatabase

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TD: TerrADat

Questions?

Talk to Ali Helmig (x236) or Lisa Jones (x383) of GBI for assistance.

Form S-1: Sage-Grouse Site-Scale Seasonal Habitat Data Summary

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Seasonal Habitat: Winter, Nesting, Brood Rearing			Associated Leks: Little Coyote Ck 12, Alkali Spring, E Clementine, E Velvet

Land Cover Type	Ecological Site	Area (ha/ac) or Length (km/mi)	Transects (#)	Indicator Values from Data Forms (means in most cases)								
				$\bar{x}$ Sage Cover (%)	$\bar{x}$ Sage Ht. (cm)	$\bar{x}$ Predominant Sage Shape (# of S and C)	$\bar{x}$ PG Ht. (cm)	$\bar{x}$ PF Ht. (cm)	$\bar{x}$ PG Cover (%)	$\bar{x}$ PF Cover (%)	Preferred Forb Species (#)	Lek Hbt. Avg. Distance to Sage Cover (m)
Mountain Big Sage/ Idaho Fescue	DRG 25-1	.95 ha	3	3.3	50.0	C=3/5=60% S=2/5=40%	70.3	28.0	23.3	20.6		
Low sage/ Wyoming Sage/ Squirreltail	DRG 25-2	1.9 ha	6	7.7	53.6	C=7/7=71.4% S=2/7=28.6%	45.9	0.0	51.3	5.0		
Mountain Sage/ Needle and Thread	DRG 25-4	.95 ha	3	.7	85.0	C= 1/1=100%	53.5	0.0	30.7	4.7		

Form S-3: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Breeding Habitat (Nesting/Early Brood-Rearing)

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Land Cover Type: Low Sage/Wyoming Big Sage/ Squirreltail			Ecological Site: DRG 25-2
Associated Leks: Little Coyote Ck 12, Alkali Spring, E Clementine, E Velvet			Number of Transects: 6
Area Sampled (ha/ac): 1.9 ha			Site Info.: ☑ Arid Site ☐ Mesic Site

List UTM Coordinates (coordinates, zone, datum) of All Transects:

4553025 X 551869, 4552966 X 542100 Zone 11 NAD 83

Habitat Indicator	$\bar{x}$	Suitable	✔	Marginal	✔	Unsuitable	✔
		Habitat Indicator Suitability Range					
Sagebrush Canopy Cover (mean)	7.7	15 to 25%		5 to <15% or >25%	✓	<5%	
Sagebrush Height Mesic Site (mean) Arid Site (mean)	 53.6	 40 to 80 cm 30 to 80 cm	 ✓	 20 to <40 cm or >80 20 to <30 cm or >80	 	 <20 cm <20 cm	
Predominant Sagebrush Shape (mode) Spreading (*n*) Columnar (*n*)	 2 5	Spreading		Mix of spreading and columnar		Columnar	✓
Perennial Grass Height (mean)	45.9	≥18 cm	✓	10 to <18 cm		<10 cm	
Perennial Forb Height (mean)	0.0	≥18 cm		10 to <18 cm		<10 cm	✓
Perennial Grass Cover Mesic Site (mean) Arid Site (mean)	 0 0 51.3	 ≥15% ≥10%	 ✓	 5 to <15% 5 to <10%	 	 <5% <5%	
Perennial Forb Cover Mesic Site (mean) Arid Site (mean)	 0.0 5.0	 ≥10% ≥5%	 	 5 to <10% 3 to <5%	 ✓	 <5% <3%	
Preferred Forb Availability (relative to site potential)		Preferred forbs are common with several species present		Preferred forbs are common but only a few species are present		Preferred forbs are rare	✓
Number of Preferred Forb Species (*n*)	4						
Site-Scale Suitability		**Suitable**		**Marginal**	✓	**Unsuitable**	

Does ecological site potential limit suitability potential? ☐ Yes ☑ No ☐ Unknown

Drought Condition: ☐ Extreme Drought ☐ Severe Drought ☑ Moderate Drought ☐ Mid-Range
GDB Plot Details table: ☐ Moderately Moist ☐ Very Moist ☐ Extremely Moist
Recent Weather Past 12 field

Rationale for Overall Suitability Rating:

Preferred forbs represented 0% of LPI
Sage height was not taken in the snow.

Form S-4: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Upland Summer/Late Brood-Rearing Habitat

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Land Cover Type: Low Sage/Wyoming Big Sage/ Squirreltail			Ecological Site: DRG 25-2
Number of Transects: 6			Area Sampled (ha/ac): 1.9 ha

List UTM Coordinates (coordinates, zone, datum) of All Transects:

4553025 X 551869, 4552966 X 542100 Zone 11 NAD 83

Habitat Indicator	$\bar{x}$	Suitable	✓	Marginal	✓	Unsuitable	✓
Sagebrush Cover (mean)	7.7	10 to 25%		5 to <10% or >25%	✓	<5%	
Sagebrush Height (mean)	53.6	40 to 80 cm	✓	20 to <40 or >80 cm		<20cm	
Perennial Grass and Forb Cover (mean)	28 15	≥15 %	✓	5 to <15%		<5%	
Preferred Forb Availability (relative to site potential)		Preferred forbs are common with appropriate numbers of species present		Forbs are common but only a few preferred species are present		Preferred forbs are rare	✓
Number of Preferred Forb Species (*n*)	4						
Site-Scale Suitability		Suitable		Marginal	✓	Unsuitable	

Habitat Indicator Suitability Range

Does site potential limit suitability?	☐ Yes	☑ No	☐ Unknown	
Drought Condition: GDB Plot Details table: Recent Weather Past 12 field	☐ Extreme Drought	☐ Severe Drought	☑ Moderate Drought	☐ Mid-Range
	☐ Moderately Moist	☐ Very Moist	☐ Extremely Moist	

Rationale for Overall Suitability Rating:

Preferred forbs represented 0% of LPI
Sage height was not taken in the snow.

Form S-6: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Winter Habitat

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Land Cover Type: Low Sage/Wyoming Big Sage/ Squirreltail			Ecological Site: DRG 25-2
Number of Transects: 6			Area Sampled (ha/ac): 1.9 ha

List UTM Coordinates (coordinates, zone, datum) of All Transects:

4553025 X 551869, 4552966 X 542100 Zone 11 NAD 83

Habitat Indicator Suitability Range							
Habitat Indicator	$\bar{x}$	Suitable	✔	Marginal	✔	Unsuitable	✔
Sagebrush Cover (mean)	7.7	≥10 %		5 to <10%	✓	<5%	
Sagebrush Height (above snow) (mean)	53.6	≥25 cm	✓	>10 to <25 cm		≤10 cm	

Site-Scale Suitability	Suitable		Marginal	✓	Unsuitable	

Rationale for Overall Suitability Rating:

Preferred forbs represented 0% of LPI
Sage height was not taken in the snow.

Annotated Habitat Assessment Framework Worksheets

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Abbreviations:

GDB: NV LHA Geodatabase

LPI: Line-point intercept (the method used to generate percent cover and plant heights)

RD: Reporting Database (a Microsoft Access file that must be linked to the appropriate DIMA in order to generate tables; see the Step by Step Instructions for Using the AIMRD v 1.42 on the DFS for more detail)

TD: TerrADat

Questions?

Talk to Ali Helmig (x236) or Lisa Jones (x383) of GBI for assistance.

Form S-1: Sage-Grouse Site-Scale Seasonal Habitat Data Summary

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Seasonal Habitat: Winter, Nesting, Brood Rearing			Associated Leks: NA

Land Cover Type	Ecological Site	Area (ha/ac) or Length (km/mi)	Transects (#)	Indicator Values from Data Forms (means in most cases)								
				$\bar{x}$ Sage Cover (%)	$\bar{x}$ Sage Ht. (cm)	$\bar{x}$ Predominant Sage Shape (# of S and C)	$\bar{x}$ PG Ht. (cm)	$\bar{x}$ PF Ht. (cm)	$\bar{x}$ PG Cover (%)	$\bar{x}$ PF Cover (%)	Preferred Forb Species (#)	Lek Hbt. Avg. Distance to Sage Cover (m)
Mountain Big Sage/ Idaho Fescue	DRG 25-1	.95 ha	3	3.3	50.0	[illegible]	70 3	28.0	23.3	20.6		
Low sage/ Wyoming Sage/ Squirreltail	DRG 25-2	1.9 ha	6	7.7	53.6	[illegible]	45.9	0.0	51.3	5.0		
Mountain Sage/ Needle and Thread	DRG 25-4	.95 ha	3	.7	85.0	C= 1/1=100%	53 5	0.0	30.7	4.7		

Form S-3: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Breeding Habitat (Nesting/Early Brood-Rearing)

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Land Cover Type: Mountain Sage/ Needle and Thread			Ecological Site: DRG 25-4
Associated Leks: NA			Number of Transects: 3
Area Sampled (ha/ac): 0.95			Site Info.: ☑ Arid Site ☐ Mesic Site

List UTM Coordinates (coordinates, zone, datum) of All Transects:

542353 X 4543409 Zone 11 NAD 83

Habitat Indicator Suitability Range							
Habitat Indicator	$\bar{x}$	**Suitable**	✔	**Marginal**	✔	**Unsuitable**	✔
Sagebrush Canopy Cover (mean)	0.7	15 to 25%		5 to <15% or >25%		<5%	✓
Sagebrush Height Mesic Site (mean) Arid Site (mean)	85.0	40 to 80 cm 30 to 80 cm		20 to <40 cm or >80 20 to <30 cm or >80	✓	<20 cm <20 cm	
Predominant Sagebrush Shape (mode) Spreading (*n*) Columnar (*n*)	0 1	Spreading		Mix of spreading and columnar		Columnar	✓
Perennial Grass Height (mean)	53.5	≥18 cm	✓	10 to <18 cm		<10 cm	
Perennial Forb Height (mean)	0.0	≥18 cm		10 to <18 cm		<10 cm	✓
Perennial Grass Cover Mesic Site (mean) Arid Site (mean)	0.0 30.7	≥15% ≥10%	✓	5 to <15% 5 to <10%		<5% <5%	
Perennial Forb Cover Mesic Site (mean) Arid Site (mean)	0.0 4.7	≥10% ≥5%		5 to <10% 3 to <5%		<5% <3%	✓
Preferred Forb Availability (relative to site potential) Number of Preferred Forb Species (*n*)	10	Preferred forbs are common with several species present		Preferred forbs are common but only a few species are present	✓	Preferred forbs are rare	
Site-Scale Suitability		**Suitable**		**Marginal**	✓	**Unsuitable**	

Does ecological site potential limit suitability potential? ☐ Yes ☑ No ☐ Unknown

Drought Condition: ☐ Extreme Drought ☐ Severe Drought ☑ Moderate Drought ☐ Mid-Range
GDB Plot Details table: ☐ Moderately Moist ☐ Very Moist ☐ Extremely Moist
Recent Weather Past 12 field

Rationale for Overall Suitability Rating:

Preferred forbs represented 2% of LPI
Sage height was not taken in the snow

Form S-4: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Upland Summer/Late Brood-Rearing Habitat

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Land Cover Type: Mountain Sage/ Needle and Thread			Ecological Site: DRG 25-4
Number of Transects: 3			Area Sampled (ha/ac): 0.95

List UTM Coordinates (coordinates, zone, datum) of All Transects:

542353 X 4543409 Zone 11 NAD 83

Habitat Indicator Suitability Range

Habitat Indicator	$\bar{x}$	Suitable	✔	Marginal	✔	Unsuitable	✔
Sagebrush Cover (mean)	0.7	10 to 25%		5 to <10% or >25%		<5%	✓
Sagebrush Height (mean)	85.0	40 to 80 cm		20 to <40 or >80 cm	✓	<20cm	
Perennial Grass and Forb Cover (mean)	17.7	≥15 %	✓	5 to <15%		<5%	
Preferred Forb Availability (relative to site potential)		Preferred forbs are common with appropriate numbers of species present		Forbs are common but only a few preferred species are present	✓	Preferred forbs are rare	
Number of Preferred Forb Species (*n*)	10						

Site-Scale Suitability	Suitable		Marginal	✓	Unsuitable	

Does site potential limit suitability?		Yes	✓	No		Unknown		
Drought Condition: GDB Plot Details table: Recent Weather Past 12 field		Extreme Drought		Severe Drought	✓	Moderate Drought		Mid-Range
		Moderately Moist		Very Moist		Extremely Moist		

Rationale for Overall Suitability Rating:

Preferred forbs represented 2% of LPI
Sage height was not taken in the snow

Form S-6: Sage-Grouse Site-Scale Habitat Suitability Worksheet – Winter Habitat

Date: 8/8/16	County: Elko	State: NV	Evaluator(s): Nycole Burton
Population: North Fork			Home Range Name: Sheep Range
Land Cover Type: Mountain Sage/ Needle and Thread			Ecological Site: DRG 25-4
Number of Transects: 3			Area Sampled (ha/ac): 0.95

List UTM Coordinates (coordinates, zone, datum) of All Transects:

542353 X 4543409 Zone 11 NAD 83

Habitat Indicator Suitability Range							
Habitat Indicator	$\bar{x}$	**Suitable**	✔	**Marginal**	✔	**Unsuitable**	✔
Sagebrush Cover (mean)	0.7	≥10 %		5 to <10%		<5%	✓
Sagebrush Height (above snow) (mean)	85.0	≥25 cm	✓	>10 to <25 cm		≤10 cm	
Site-Scale Suitability		**Suitable**		**Marginal**	✓	**Unsuitable**	

Rationale for Overall Suitability Rating:

Preferred forbs represented 2% of LPI
Sage height was not taken in the snow

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ROSSI MINE EXPANSION PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

APPENDIX I

OPERATIONS NOISE ANALYSIS REPORT

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FINAL

AECOM

AECOM
401 West A Street
Suite 120
San Diego
CA 92101
USA
aecom.com

Project name:
Halliburton Energy Services, Inc.
Rossi Mine Expansion EIS Support

Project ref:
60537402

To:
Mr. Klete Fallowfield
Geologist/Environmental Specialist
Halliburton Energy Services, Inc.
912 Dunphy Ranch Rd.
Battle Mountain, Nevada 89820

From:
Mark Storm, INCE Bd. Cert.
Christopher Kaiser, INCE
Cole Martin, INCE

Date:
June 19, 2017

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Rossi Mine Expansion Operations Noise Analysis

1. Executive Summary

Halliburton Energy Services, Inc. (Halliburton) authorized AECOM Technical Services Inc. (AECOM) to conduct a predictive study of noise emission from its proposed Rossi Mine Expansion project (Project), with attention paid to a known active greater sage-grouse lek located approximately 1.12 miles northeast of the Project site.

With Project information from the previously-prepared Preliminary Draft Environmental Impact Statement (PDEIS) and other relevant reports provided by Halliburton, AECOM developed three-dimensional models of Project operations sound propagation to cover a variety of scenarios and conditions. These scenarios included a predictive study of both Project alternatives (Proposed Action and Reconfiguration), as well as each chronological "end" or milestone of the expected Project lifecycle: 1) Project Onset, and 2) Completion (i.e., the new or expanded pits are dug and the waste rock dump sites are at their peak heights). Modeling included considerations of potential variances in equipment/vehicle quantities and distribution of activity over expected work areas.

After modeling these scenarios, predicted results were compared with an industry-accepted baseline outdoor ambient sound level that compares well with leading research on industrial noise effects on greater sage-grouse and measurements previously measured at the studied lek area. Adverse noise effects from the Project to the greater sage-grouse at Little coyote Creek 12 lek are not anticipated. This conclusion is based on the differences between predicted Project operations L_{50} values and the background baseline L_{90} all being less than 10 dBA, which is the threshold adopted by the U.S. Bureau of Land Management (BLM).

Therefore, based on the predictive modeling and foregoing analysis assumptions described herein, AECOM does not anticipate that Project operations will require noise mitigation measures.

2. Introduction

AECOM performed acoustical consulting services for the Halliburton proposed Rossi Mine Expansion, located on BLM lands at the Rossi Mine site in Elko County, Nevada.

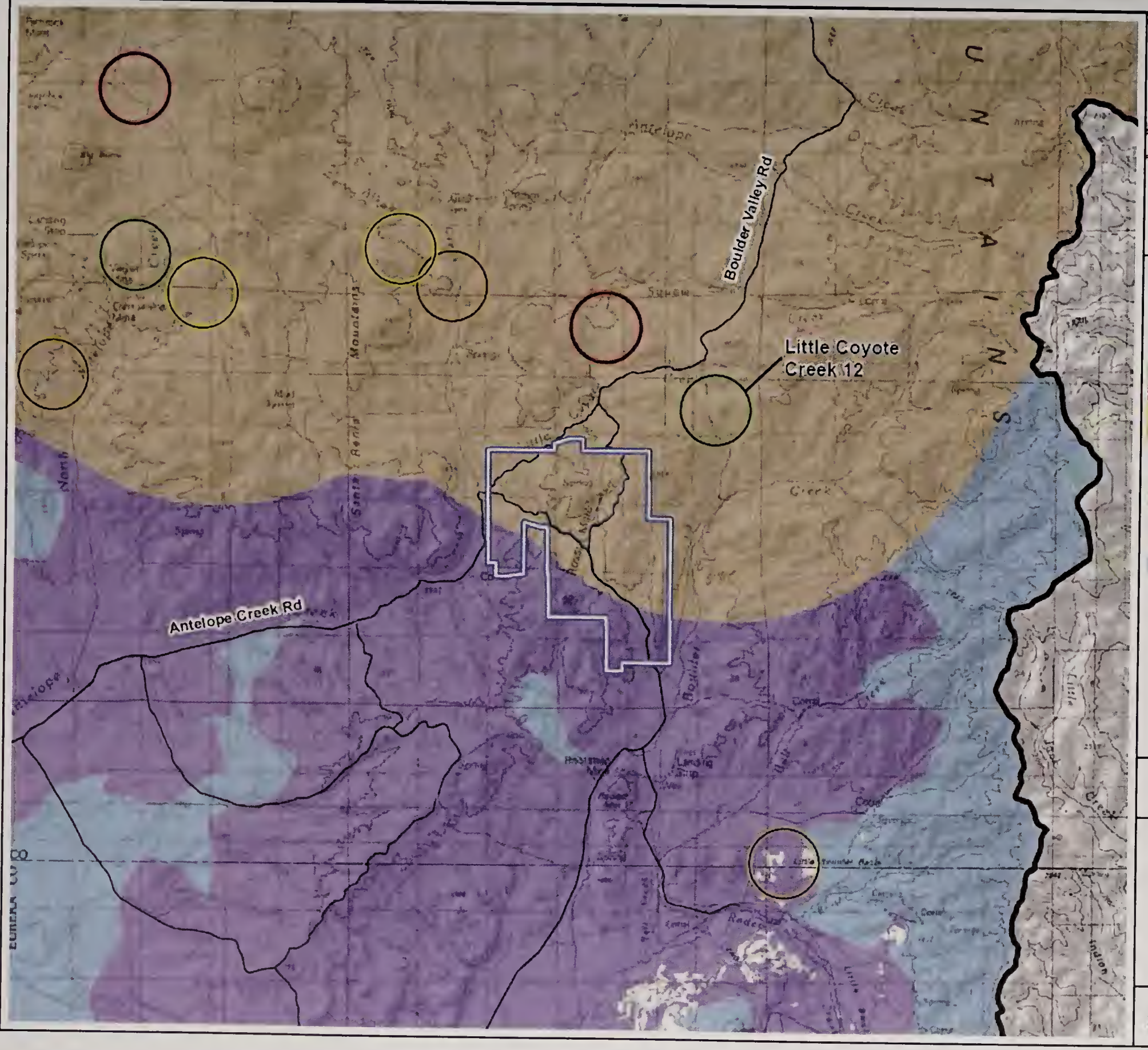
AECOM performed predictive sound propagation modeling of expected aggregate Project operations noise emission for both the Proposed Action and Reconfiguration Alternative as described in a previously prepared

Project PDEIS. AECOM then compared these predictions with BLM-recognized evaluation criteria to assess potential environmental noise impacts at a noise-sensitive receiver of interest (an active greater sage-grouse lek). If worst-case modeling scenarios predicted a Project-attributed adverse impact at the lek location, AECOM would have suggested conceptual options for Project noise mitigation as part of a proposed noise mitigation plan (NMP).

2.1 Understanding of Project

The BLM needs to assess Project-related noise impacts on nearby greater sage-grouse lek locations. Nevada Department of Wildlife (NDOW) currently lists four (4) greater sage-grouse leks within a four-mile radius of the Project boundary; however, only one of these leks has been observed and recorded as currently active by NDOW—Little Coyote Creek 12, shown to the northeast of the Rossi Mine boundary in **Figure 1**.

J.C. Brennan & Associates (JCBA) performed noise level monitoring at this lek in 2015, including collecting pre-Project outdoor ambient sound environment data used here as a baseline for comparison with predicted future outdoor ambient noise levels that would include Project-attributed sound. These 2015 outdoor ambient sound level measurements would account for, as JCBA indicated in its report, "existing noise-producing uses, traffic noise, OHV vehicles, ranching vehicles, and the effects of ambient noise from wind" (JCBA 2015). AECOM understands from Halliburton that operations were being conducted at the existing Rossi Mine during the JCBA monitoring periods; therefore, measurements represent existing mine operations noise-producing activities.



Rossi Mine Expansion Operations Noise Analysis

Figure 1

Greater Sage-grouse Habitat in the Project Study Area

Source: Halliburton 2016.

FINAL

2.2 Acoustical Terminology

To provide the reader a frame of reference for the discussion of acoustics in this technical document, the following are summaries of acoustical terms, metrics and descriptors.

- *Noise* – Whether something is perceived as a noise event is influenced by the type of sound, the perceived importance of the sound, its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the listener. Local jurisdictions may have legal definitions on what constitutes "noise" and such environmental parameters to consider.

- *Sound* – For purposes of this analysis, sound is a physical phenomenon generated by vibrations that result in waves that travel through a medium, such as air, and result in auditory perception by the human brain.

- *Frequency* – Sound frequency is measured in Hertz (Hz), which is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second it generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the best human ear.

- *Amplitude or Level* – Is measured in decibels (dB) using a logarithmic scale. A sound level of zero dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above approximately 110 dB begin to be felt inside the human ear as discomfort and eventually pain at 120 dB and higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about one to two dB. A three to five dB change is readily perceived. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or if decreasing by 10 dB, halving) of the sound's loudness.

- *Sound pressure* – Sound level is usually expressed by reference to a known standard. This report refers to sound pressure level (SPL or L_p). In expressing sound pressure on a logarithmic scale, the sound pressure is compared to a reference value of 20 micropascals (µPa). L_p depends not only on the power of the source, but also on the distance from the source and on the acoustical characteristics of the space surrounding the source.

- *Sound power* – Unlike sound pressure, which varies with distance from a source, sound power is the acoustic power of a source typically expressed in Watts. Sound power level (PWL or L_w) is the acoustic power radiated from a source, expressed in decibels when referenced to a power value of 10^{-12} Watts.

- *A-weighting* – Sound from a tuning fork contains a single frequency (a pure tone), but most sounds one hears in the environment do not consist of a single frequency and instead are composed of a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects the typical frequency-dependent sensitivity of average healthy human hearing. This is called "A-weighting," and the decibel level measured is referred to as dBA. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA "curve" of decibel adjustment per octave band center frequency (OBCF) from a "flat" or unweighted SPL.

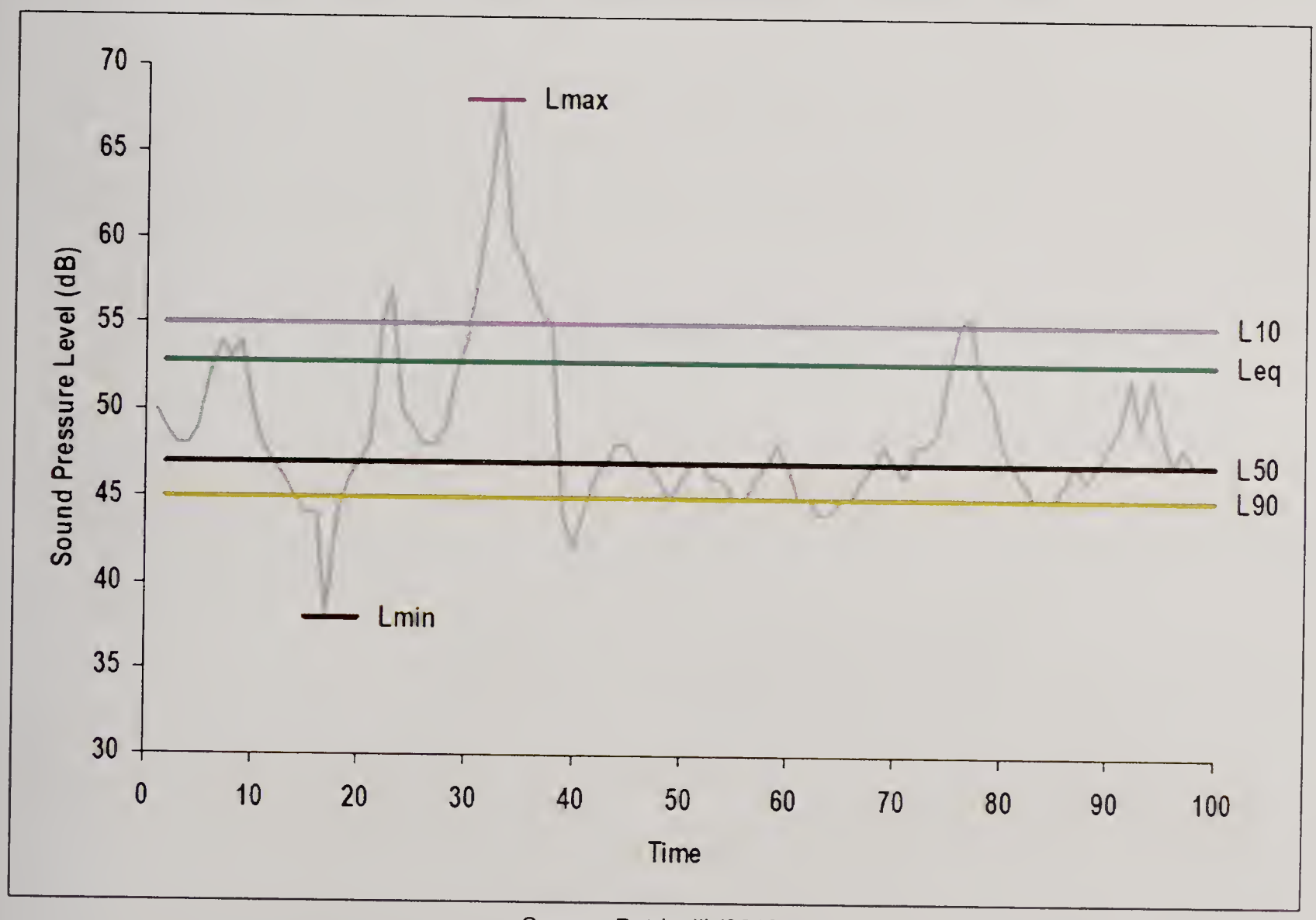
- *Equivalent sound level* – Environmental noise levels vary continuously and include a mixture of noise from near and distant sources. A single descriptor, L_{eq}, may be used to describe such sound that is changing in level from one moment to another. L_{eq} is the energy-average sound level during a measured time interval.

It is the "equivalent" constant sound level that would have to be produced by a single, steady source to equal the acoustic energy contained in the fluctuating sound level measured.

- *Maximum or minimum sound level (L_{max} or L_{min})* – these values are indicators that represent the root mean square (RMS) maximum and minimum noise levels during a given monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the "noise floor."

- *Percentile-exceeded statistical sound level (L_n)* – The sound level exceeded "n" percent of a specific time period. For instance, L_{50} is the sound level exceeded 50% of the time and is called the median sound level. L_{90} is the sound level exceeded 90% of the time and is usually an indicator of "steady-state" or background sound, while L_{10} is an indicator of intermittent loud sounds in an environment.

Figure 2 displays a sample plot of measured time-varying community noise SPL over a period of time (grey line), with various above-mentioned metrics and statistical values overlaid to help show how they relate to one another. Note that by definition, the L_{10} value will never be lower than the L_{50} value and the L_{50} never less than the L_{90} value; however, the magnitude of the L_{eq} value depends on the total sound energy averaged over the specified time period, so it is possible for L_{eq} to be higher or lower than a particular L_n statistical value.



Source: Patricelli (2012)

Figure 2. Sample Plot of Community Noise and Corresponding Metrics and Statistical Values

2.3 Applicable Assessment Criteria

The Record of Decision and Approved Resource Management Plan Amendments (ARMPA) for the Great Basin Region, Including the Greater Sage-Grouse Sub-Regions of Idaho, Southwestern Montana, Nevada and Northeastern California, Oregon and Utah (BLM, 2015) include decisions that state as follows:

> "Authorizations and permits will limit noise from discretionary activities (during construction, operation, and maintenance) to not exceed 10 decibels above ambient sound levels at least 0.25 mile from active and pending leks, from 2 hours before to 2 hours after sunrise and sunset during the breeding season."

Although this language indicates that 10 dB is the relative threshold to be applied, it does not define what acoustical metrics or statistical values should be used to assess predicted Project-attributed noise impacts.

The potential adverse effects of Project-related noise on greater sage-grouse were evaluated in the PDEIS on the basis of a 10 dB difference (using an A-weighted scale [dBA]) between the existing measured L_{90} statistical sound level and the Project-attributed L_{50} predicted sound level. This 10 dBA difference or "delta" between dissimilar statistical values is based on recommendations (Patricelli, 2012) to the State of Wyoming by Dr. Gail Patricelli, a leading researcher on industrial noise effects to greater sage-grouse. The delta is considered to be A-weighted on the basis of the Patricelli-recommended baseline L_{90} (or "ambient") range described with this weighting scale.

In this noise analysis, AECOM similarly adopted the 10 dBA delta between baseline L_{90} and predicted project L_{50} to assess potential adverse noise effects to the greater sage-grouse at the known active lek—Little Coyote Creek 12. Consistent with the aforementioned Patricelli recommendations, AECOM has also adopted a baseline L_{90} value of 21 dBA, which is the average of an "ambient value 20-22 dBA" (Patricelli, 2012) and within the range of measured baseline L_{90} values that JCBA reported from its field survey of outdoor ambient noise near the active lek in 2015.

While Table 3.18-4 on page 3.18-16 of the June 2017 version of the Project PDEIS identifies 18.6 as an average L_{90} noise level, AECOM notes that it is an average of four leks—of which, only Little Coyote Creek 12 lek is active per recent studies and the other three are "pending" with no recently observed lekking activities. Since this report considers only the nearest active lek as a noise-sensitive receiver, measured sound levels from the three other pending leks are irrelevant in the context of the proceeding acoustical analysis of Project operation scenarios.

3. Noise Model of Proposed Expansion Operations

3.1 Methodology

AECOM prepared a set of three-dimensional (3-D) sound propagation models of aggregate noise emission attributed to each of the two proposed Rossi Mine expansion alternatives, with emphasis on predicting noise exposure levels at the greater sage-grouse Little Coyote Creek lek that is northeast of the proposed project. AECOM's proposed usage of the commercially-available CadnaA sound propagation modeling software, including anticipated model input parameters and calculation settings, was reviewed and acknowledged by Nycole Burton and Janice Stadelman of the BLM and Lindsey Lesmeister from NDOW.

For each Project alternative, two 3-D models were developed as follows:

- *Project "Onset"* – conditions that reflect the status of the site shortly after Project commencement, with new or expanded mine pits and waste rock disposal facilities (WRDFs) at grade elevations resembling those of pre-Project geographical conditions. In other words, the mine pits have not been dug, and the WRDF (a.k.a. dump) sites have not accumulated any substantial waste material.

- *Project "Completion"* – conditions that reflect the status of the site upon expected Project completion, with new or expanded Project-related mine pits dug out to expected depths and dump sites have accumulated leveled waste material at maximum anticipated elevations.

The purpose of these two models is to quantify expected Project-attributed noise emission at each end of the Project duration in order to understand how it may change as the Project site topography changes. Near the Project's conclusion, for example and as shown schematically on the right panel of **Figure 3**, noise emission from equipment operating in the deepened mine pits would more likely be occluded by site terrain that would include newly-created mounds from the developed dump sites. Conversely, these WRDFs that would gain elevation with respect to the surrounding terrain could create opportunities for some equipment noise sources to have clearer direct sound propagation paths to the distant receiving lek.

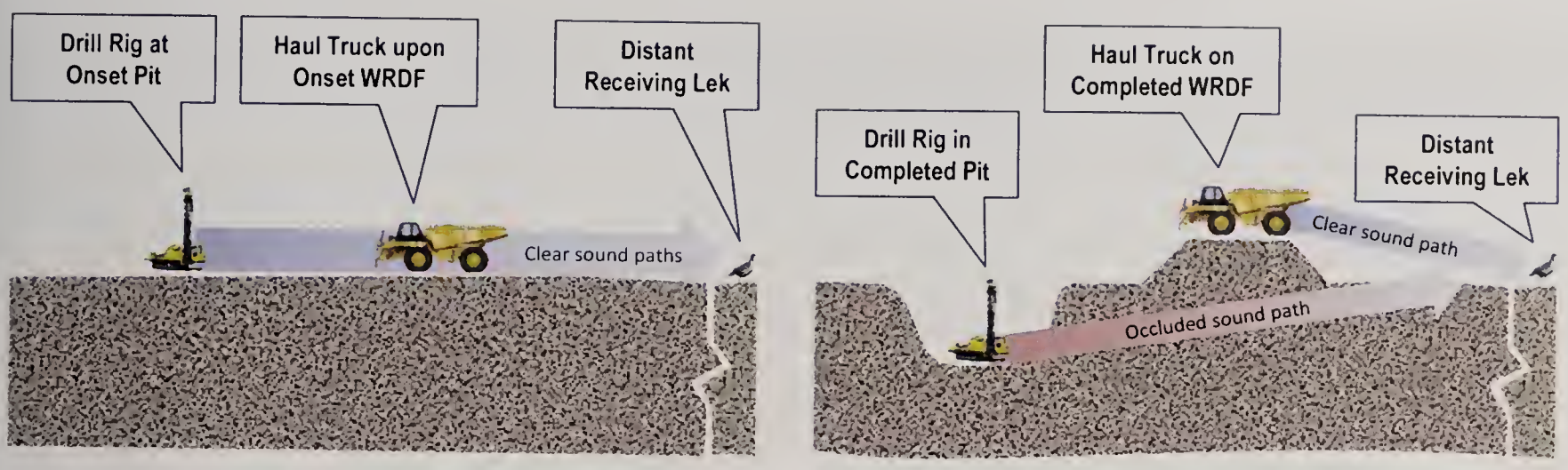


Figure 3. Simplified illustration (not to scale) of difference between Project Onset (left) and Project Completion (right) conditions

3.1.1 Model Space

Using the topographic data that Halliburton furnished, AECOM included both on-site and surrounding off-site terrain as part of the CadnaA model "build", along with the following preliminary configuration settings and assumptions.

- *CadnaA version 2017* – this is the latest commercially-available version of the software program, as of this writing.
- *Average ground surface acoustical absorption set to 0.75* – on a sliding scale between zero (acoustical reflection) and 1.0 (acoustical absorption), this chosen value intends to conservatively represent an average for the mixture of ground surface types over which propagating Project-attributed sound would travel. Solid, smooth-faced rock would be considered much less, while loose gravels and porous soils or vegetative cover would be higher. Since the Project vicinity that includes the active lek can generally be characterized as porous desert landscape topped with sage brush and other vegetation, the selected value seems appropriate for purposes of this analysis.
- *Maximum order of reflections set to 0* – this means that, for purposes of this analysis, sound is not expected to reflect off of encountered terrain or structural surfaces. Given the nature of this study—predicting Project noise in a rural and remote outdoor environment, not an urban one comprising a dense assortment of buildings—such a model configuration setting seems appropriate and still allows reasonable expected accuracy.
- *Topographic data for the Project site are 10-foot resolution, and lands out to studied receiver locations are 20-meter resolution* – these refer to the granularity of the terrain contours, and thus helps define how CadnaA generates a 3-D space by interpolating surfaces between adjoining geographical contour lines.

Figures 4 and **5** present two elevated camera-like views (looking northwest) of the Proposed Action Project alternative model space, with identified on-site areas in red indicating the assignment of equipment-related sound power for the Onset and Completion conditions, respectively. **Figures 6** and **7** present additional views of these Proposed Action Project Onset and Completion model spaces looking southward. The model spaces for the Reconfiguration Alternative Onset and Completion conditions were similarly rendered with located area-type sound sources, which represent horizontal zones over which equipment and vehicles might travel within while performing normal operations. **Figures 8** through **11** present elevated camera-like views of the Reconfiguration Alternative in a manner akin to the preceding **Figures 4** through **7** for the Proposed Action.

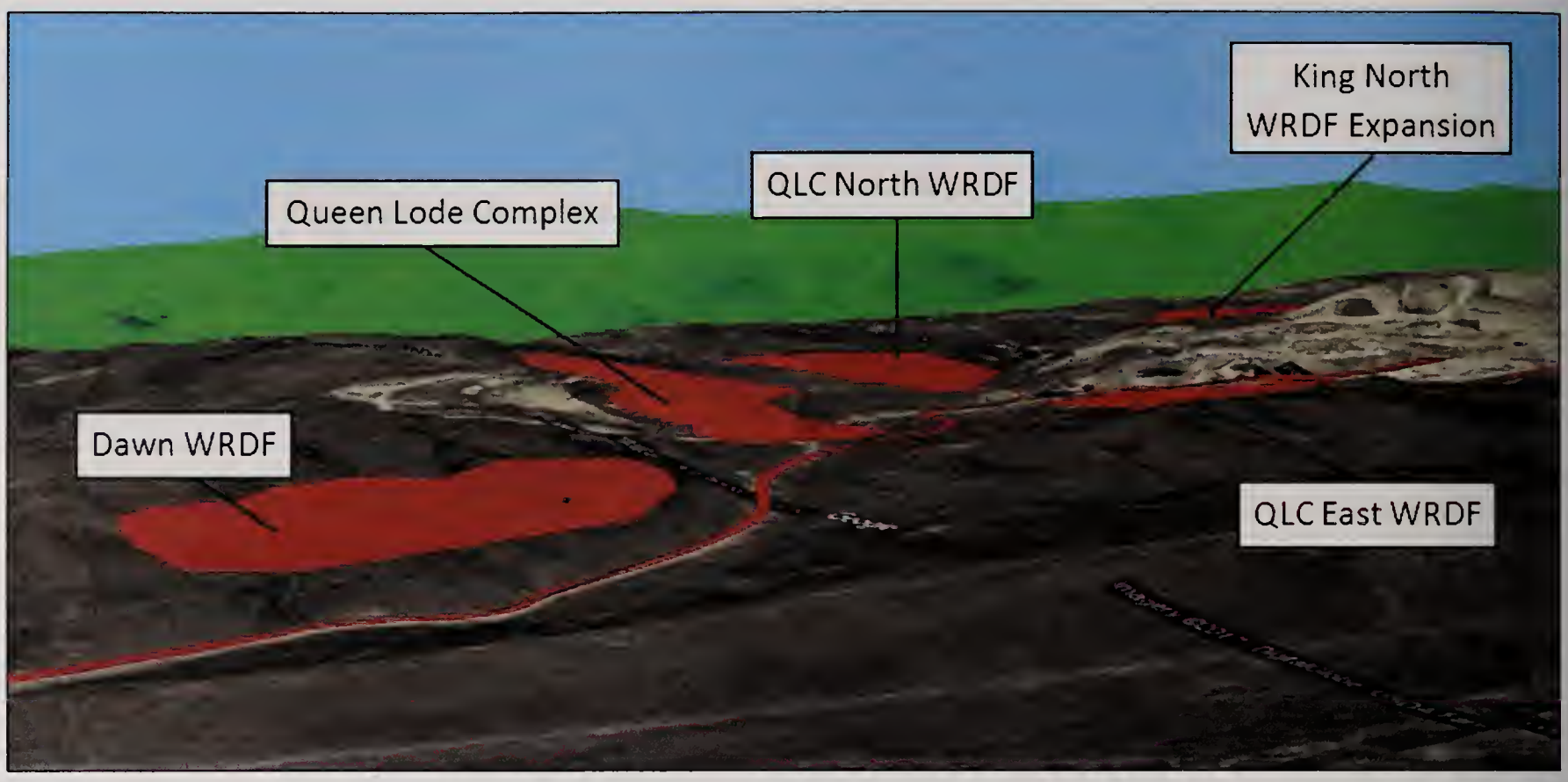


Figure 4. Elevated View of Proposed Action Model Space, Project Onset Terrain (looking northwest)

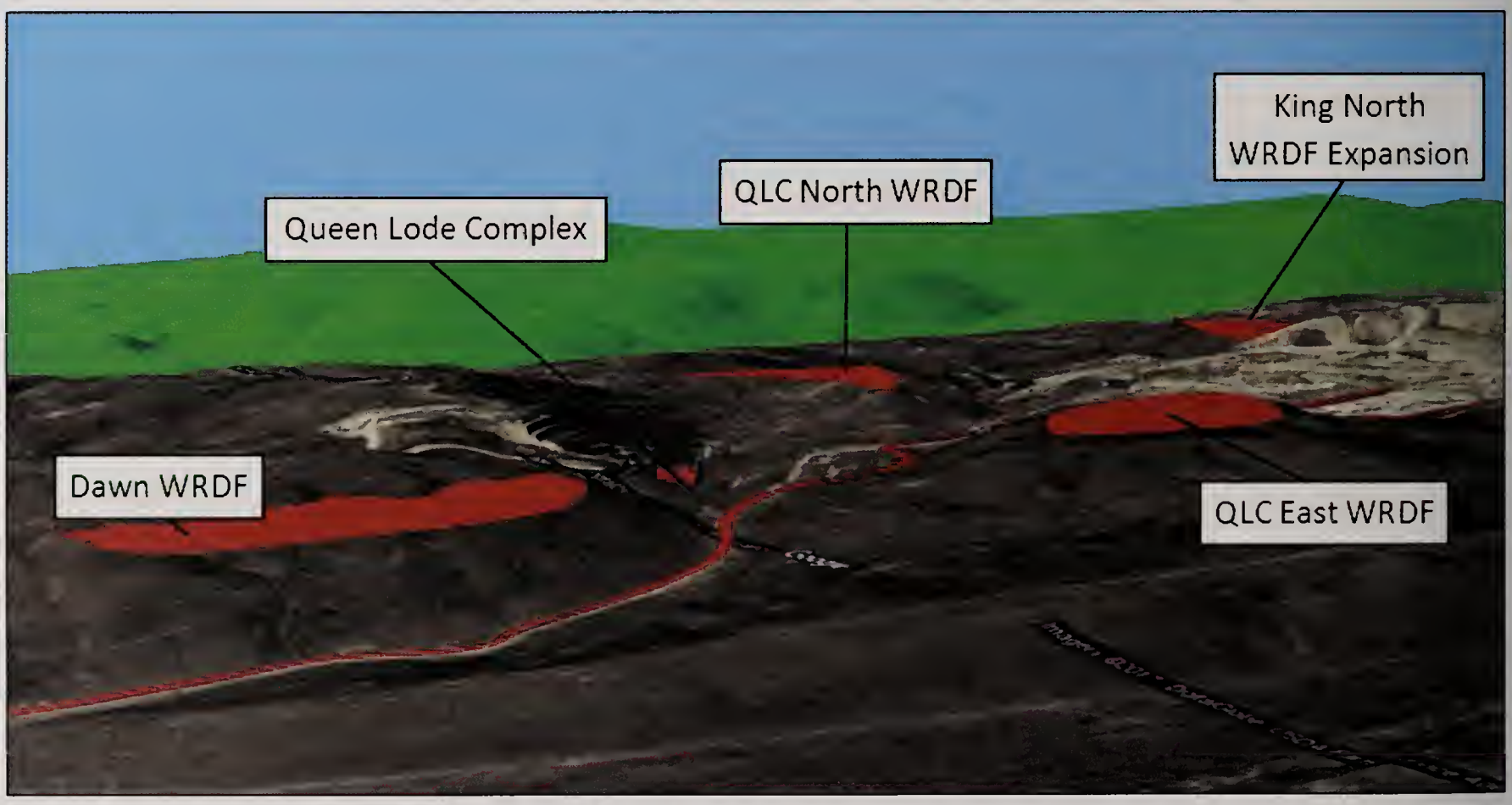


Figure 5. Elevated View of Proposed Action Model Space, Project Completion Terrain (looking northwest)

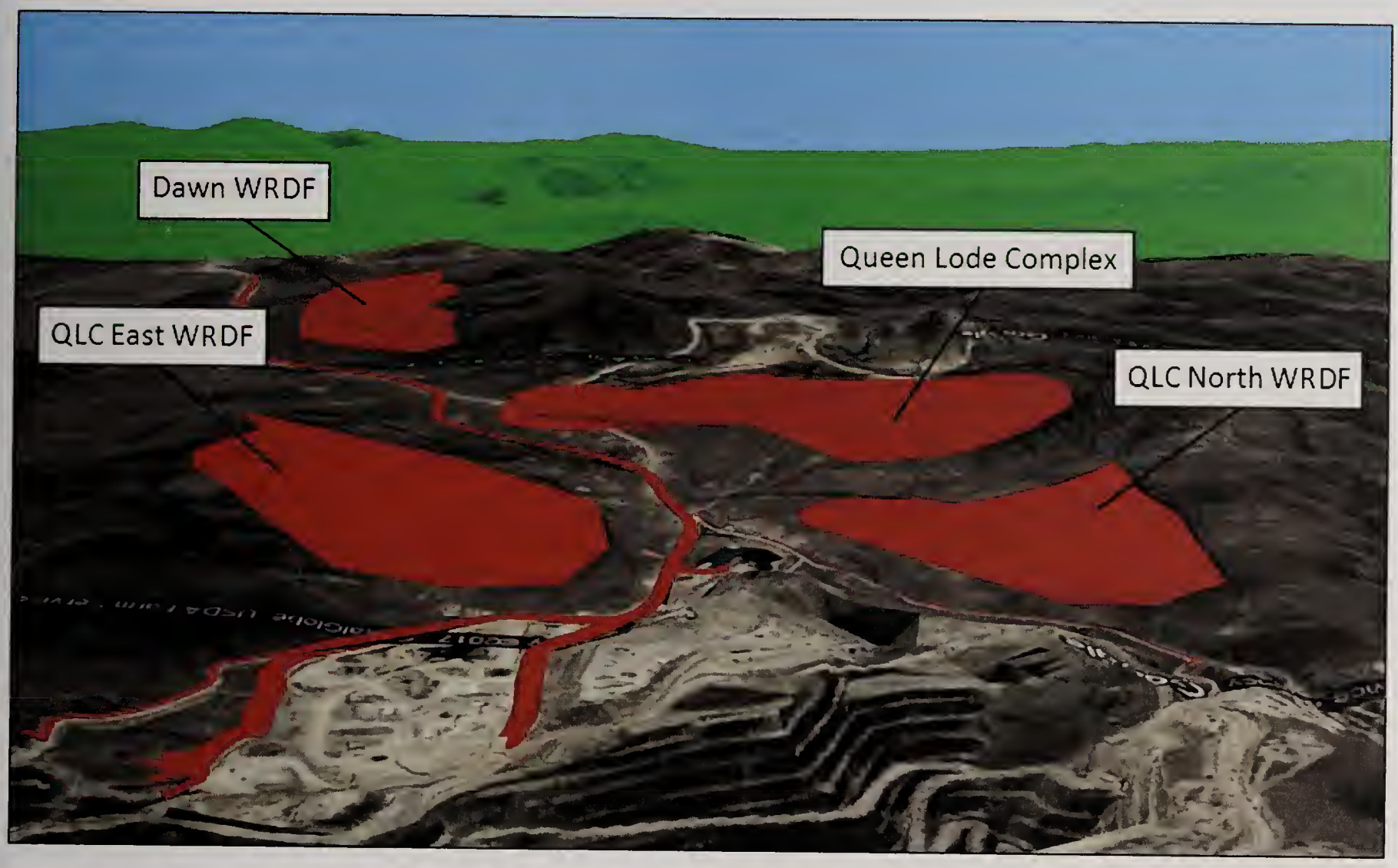


Figure 6. Elevated View of Proposed Action Model Space, Project Onset Terrain (looking south)

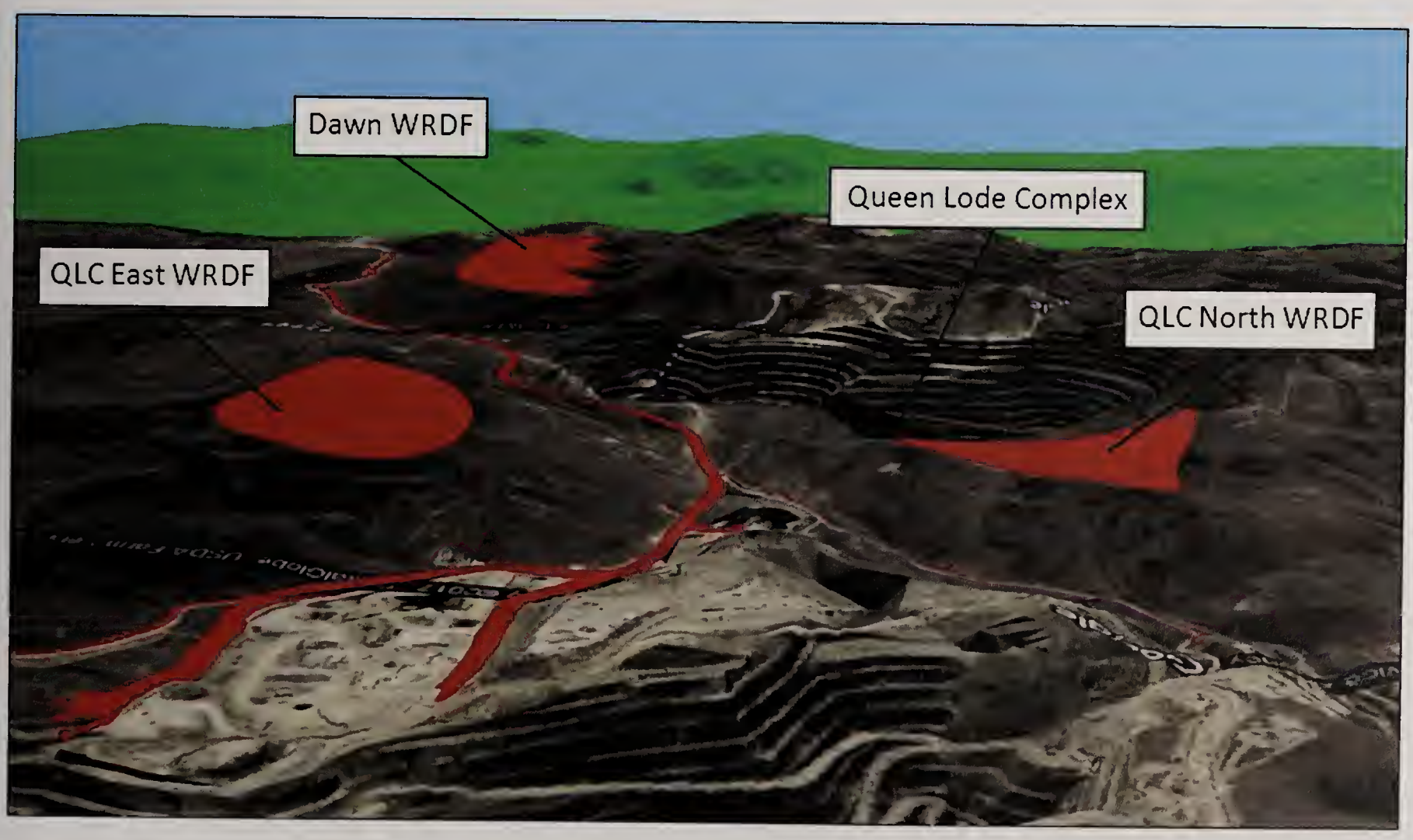


Figure 7. Elevated View of Proposed Action Model Space, Project Completion Terrain (looking south)

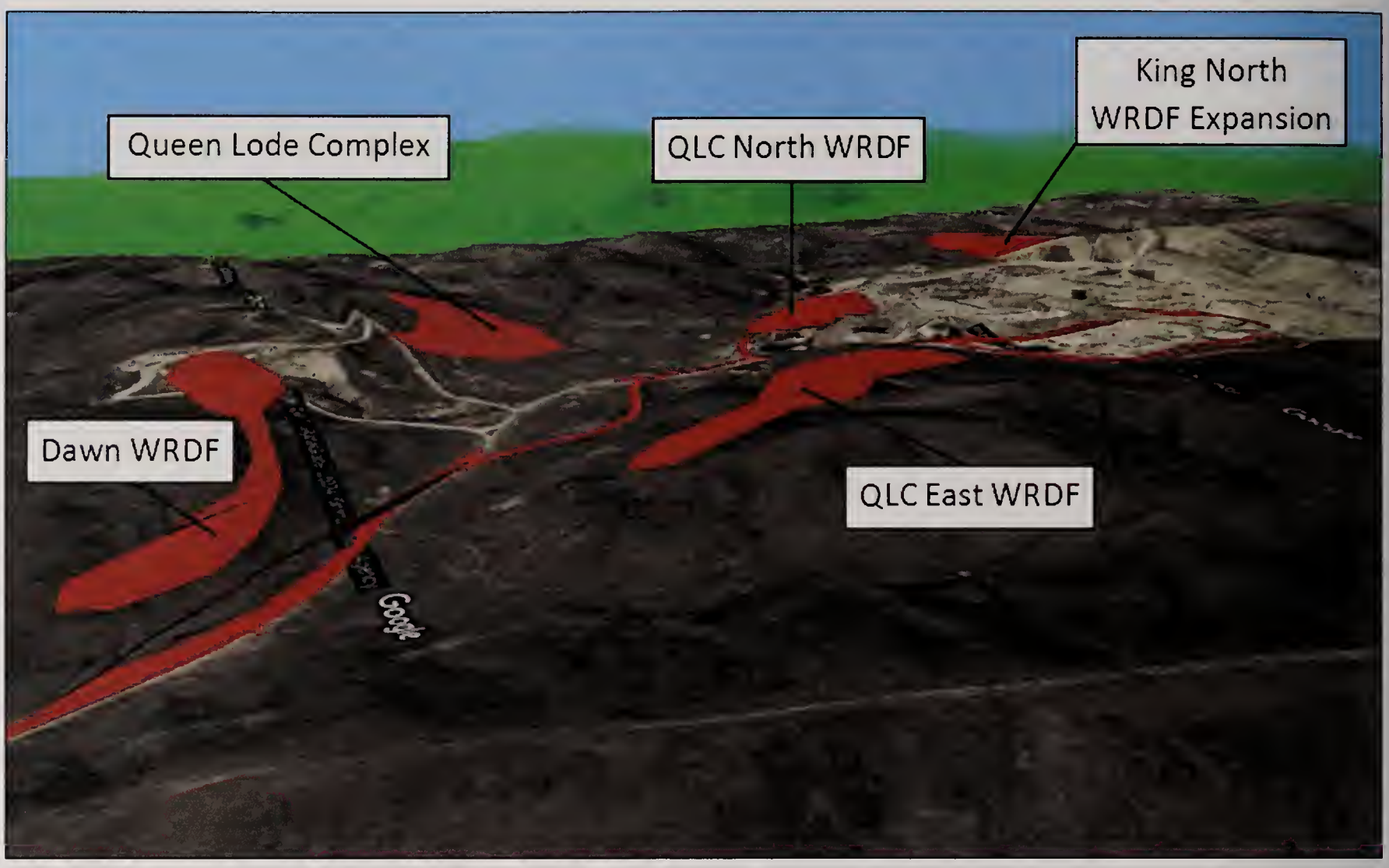


Figure 8. Elevated View of Reconfiguration Alternative Model Space, Project Onset Terrain (looking northwest)

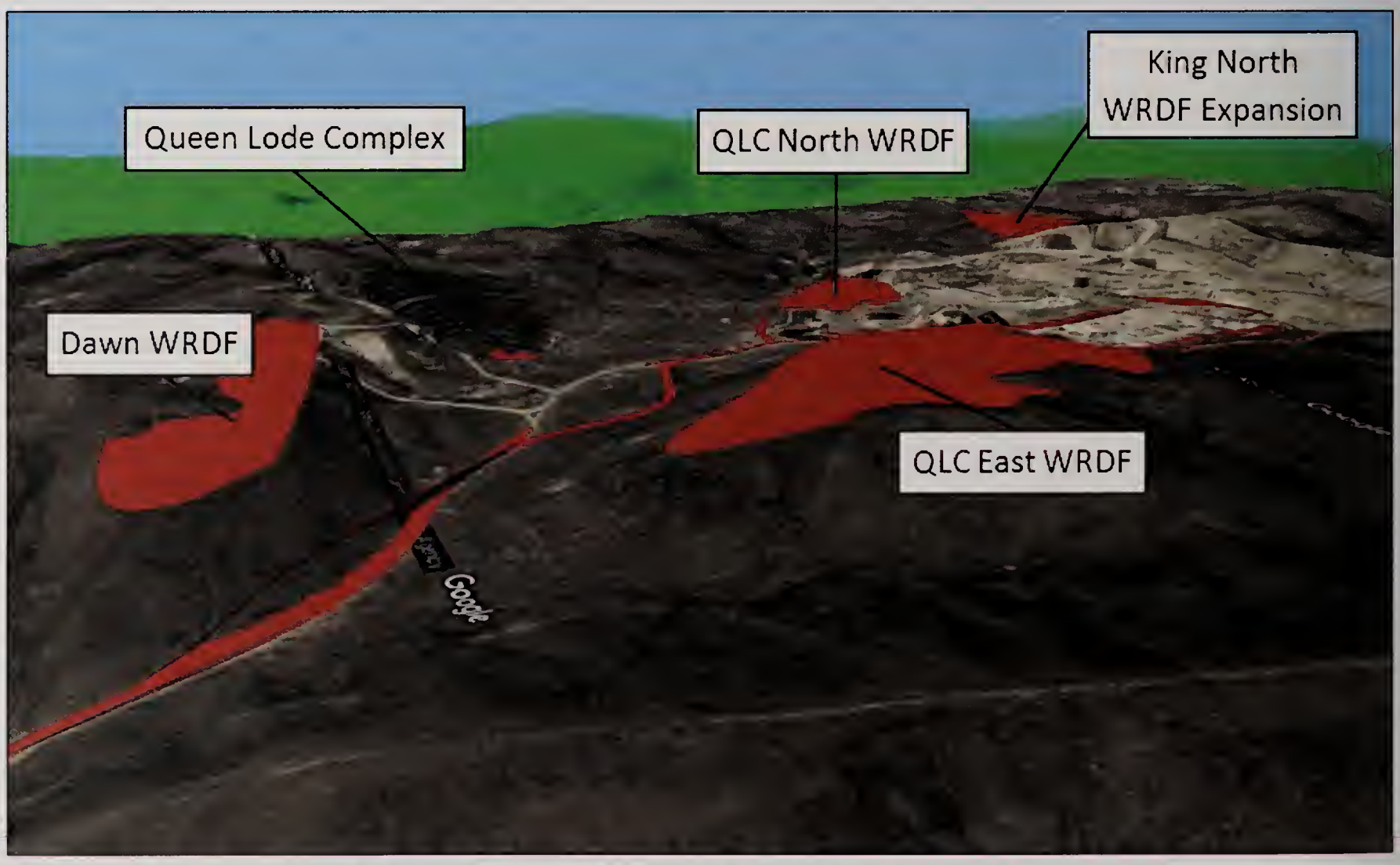


Figure 9. Elevated View of Reconfiguration Alternative Model Space, Project Completion Terrain (looking northwest)

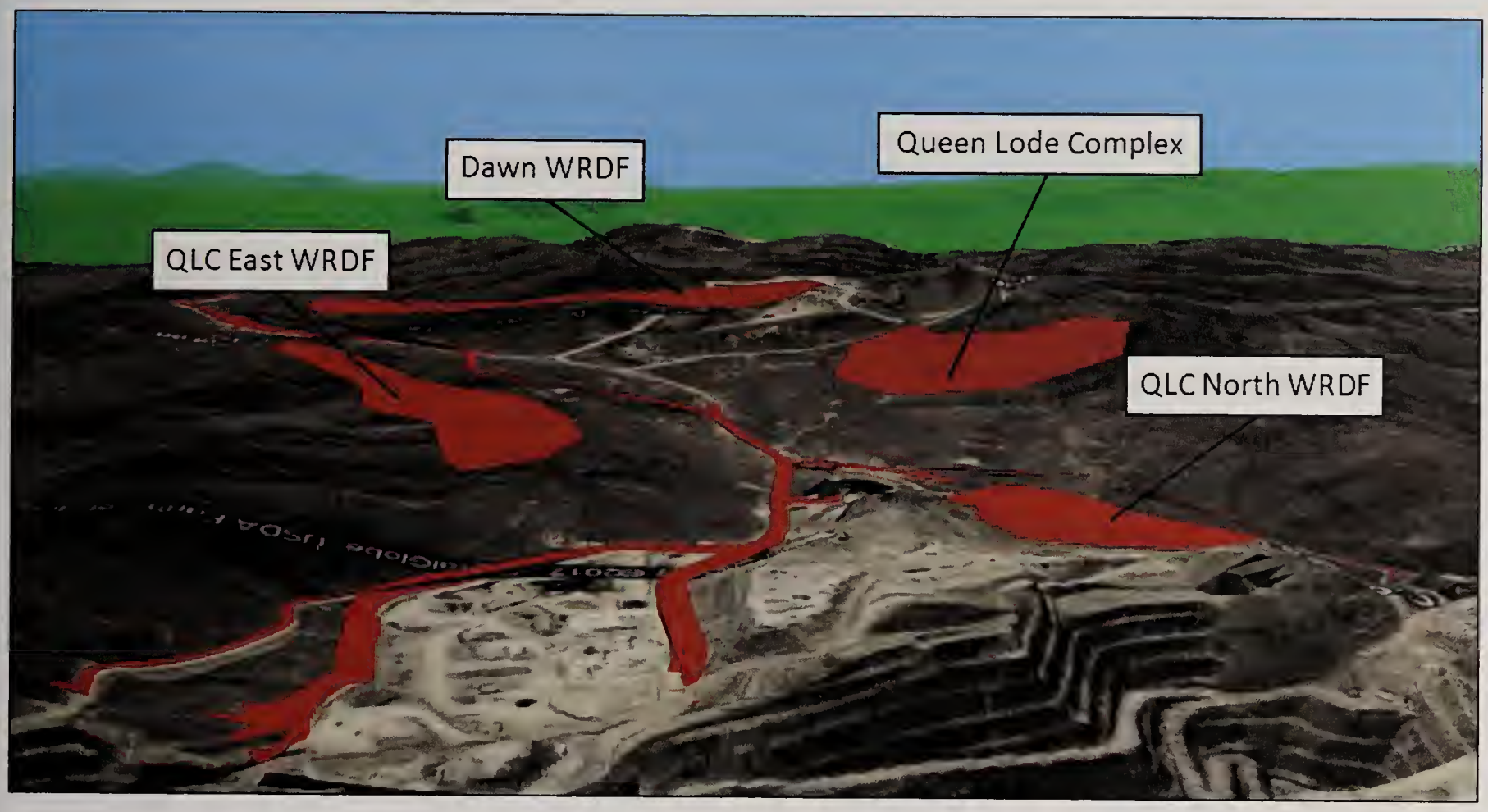


Figure 10. Elevated View of Reconfiguration Alternative Model Space, Project Onset Terrain (looking south)

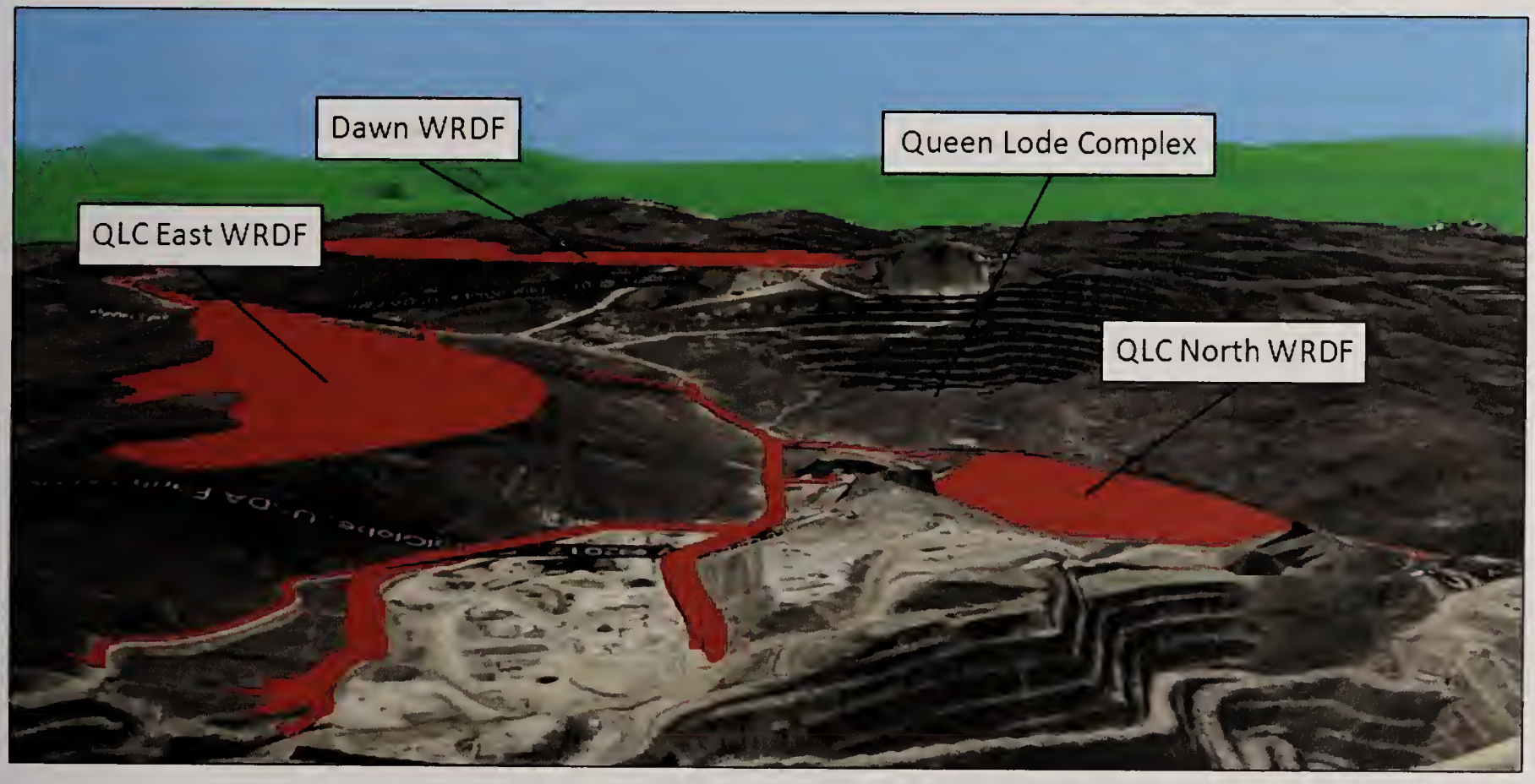


Figure 11. Elevated View of Reconfiguration Alternative Model Space, Project Completion Terrain (looking south)

3.1.2 Meteorological Input

CadnaA allows consideration of meteorological input parameters, which for this analysis included as follows:

- "Calm" or wind-neutral conditions, representing wind velocity less than 0.5 meters per second (mps) in any direction, and Conservation of Clean Air and Water in Europe (CONCAWE) Meteorological Category (Cat) 4, Pasquill Stability Category D.
- Air temperature of 10° Celsius
- Relative humidity of 50% -- on average, this value is consistent with conditions for Elko, NV as reported by via www.wundergruond.com.

This usage of "calm" (wind-neutral) conditions as a modeling parameter is compatible with calm environmental conditions that Patricelli describes in her aforementioned recommendations for establishing a 20-22 dBA "ambient value" (Patricelli 2012). In agreement with the PDEIS, were sustained wind speeds at the receiving lek to be inconsistent with these calm conditions assumed for this analysis, the resulting baseline L_{90} increase due to the "sound of wind moving across local topography and vegetation" would produce a higher baseline L_{90} value than the 21 dBA described in Section 2.3. Similarly, Patricelli acknowledges that wind can "inflate ambient values and therefore allow more noise exposure at leks" (Patricelli 2012).

AECOM also notes that while calm (wind-neutral) conditions are assumed for this acoustical analysis, the CadnaA program bases its sound propagation algorithms on International Organization of Standardization (ISO) 9613-2, which presumes a conservative "downwind" or "favorable" (ISO 1996) sound propagation path (i.e., the receiver of interest is downstream of the noise source[s]). Hence, the predicted sound levels at the lek presented in this report feature a degree of conservatism and corresponding added confidence that the applicable criteria will be met for the indicated Project operation scenarios.

3.1.3 Equipment Source Sound Levels

While the PDEIS provided a total quantity of expected equipment and vehicles associated with the Project, it did not discuss the distribution of that equipment across the various WRDFs and at what maximum grade elevations they might occur. This information is necessary for modeling Project operations in a manner that better reflects anticipated activities and where—in three-dimensional space—they are likely to occur; therefore, AECOM worked with Halliburton to develop the information presented in **Table 1** for both the Queen Lode Complex (QLC) and King North Expansion. Note that the equipment units are arranged into four distinct categories as follows:

- *Pit* – the equipment type is largely expected to function and remain in a mining pit where material is extracted;
- *Dump Facility (DF)* – the equipment is anticipated to spend a majority of its time atop the surface of a WRDF, where waste material is deposited;
- *50/50* – this equipment type is expected to spend roughly half of its operational status in a Pit, and the remainder on a DF; and,
- *Surface* – these equipment and vehicles are assumed to spend most of their operational time on the Project surface roads or at mining facilities on the "surface" (i.e., not in a Pit nor atop a DF receiving material) where selected extracted material may be processed.

The overall A-weighted SPL values associated with each equipment type appearing in **Table 1** are based on component octave band center frequency (OBCF) values that CadnaA can accept as input for each modeled sound source. This OBCF resolution enables calculation of sound propagation between sources and receivers that accurately accounts for frequency-dependent atmospheric acoustical absorption that varies with temperature, relative humidity and other environmental factors. AECOM assigned these source OBCF values by equipment types based on information from the United Kingdom's Department for Environment Food and Rural Affairs (DEFRA) Construction Noise Database (Phase 3, revised 2008), which includes data measured

from noise-producing activities and equipment at quarries and other construction sites considered comparable to the Project settings being studied.

Table 1. Reference Source Sound Pressure Levels for Single Units of Anticipated Project Equipment

Equipment (from Project PDEIS)	Comparable Reference Equipment Type	SPL, dBA @ 10m	Total Available Project Units	Assumed Source Location Category	Queen Lode Complex (QLC) Units		King North Expansion Units		Units on Project Surface Roads
					Pit	DF	Pit	DF	
Front-End Loader	Front End Loader	86	12	Pit	12	0	0	0	0
Excavator/Track Hoe	Backhoe Excavator	83	4	Pit	4	0	0	0	0
Scraper	Scraper	82	3	Pit	3	0	0	0	0
Skid Steer	Scraper	82	4	Pit	4	0	0	0	0
Grader	Motor grader	86	5	Pit	5	0	0	0	0
RC Drill Rig	Rotary Drill	87	4	Pit	4	0	0	0	0
Core Drill Rig	Rotary Drill	87	2	Pit	2	0	0	0	0
Backhoe	Backhoe Excavator	91	2	Pit	2	0	0	0	0
Track Mounted Drill	Rotary Drill	87	5	Pit	5	0	0	0	0
Articulated Truck	Haul Truck	89	6	50/50	2	2	1	1	0
Haul Truck	Haul Truck	91	30	50/50	10.5	10.5	4.5	4.5	0
Portable Light Plant	Lighting Plant	65	12	50/50	6	6	6	6	0
Water Truck	Water Truck	83	8	50/50	4	4	0	0	0
Bulldozer	Track Bulldozer	86	12	DF	0	8	0	4	0
Forklift	Pickup Truck	88	3	Surface	0	0	0	0	3
Over-the-Road Truck	Service Truck	88	10	Surface	0	0	0	0	10
Service Vehicle	Pickup Truck	88	5	Surface	0	0	0	0	5
Mobile Generator	Generator	74	12	Surface	0	0	0	0	12
Truck Tractor and Lowboy	Track Bulldozer	86	2	Surface	0	0	0	0	2
Light Vehicle	Pickup Truck	88	30	Surface	0	0	0	0	30
Crane	Crane Flatbed	82	2	Surface	0	0	0	0	2
Explosive Truck	Service Truck	88	2	Surface	0	0	0	0	2

3.2 Scenarios Studied

AECOM predicted impacts from a set of scenarios, representing multiple combinations of possible project operating conditions that included the following:

- Distribution of operating equipment and vehicles among the QLC Project areas (with proportions expressed as percentages of the total assigned to QLC).
- Overall quantity of operating equipment (i.e., as a percentage of the units displayed in **Table 1**).

Aspects of the model simulation that remained constant among the studied scenarios included the following:

- The proportions of equipment and vehicle types for QLC were the same across all scenarios assuming that the mining operations will require a similar assortment of equipment and vehicle types regardless of the on-site project area being worked.
- King North Expansion expected equipment based on Halliburton input.

- For purposes of conservatism, planned maximum Project dump heights were used for Project Completion cases. By defining assortments of equipment as horizontal area sources set at three meters above these maximum dump height elevations, sound propagation would likely experience the least degree of shielding due to intervening terrain between the modeled construction sources and the studied receptor—the Little Coyote Creek Lek.

- Planned maximum Project pit depths were used for Project Completion.

3.3 Predicted Results

Tables 2 and 3 each present three matrices of the following information for the Proposed Action and Reconfiguration Alternative, respectively:

- *X% Operation Level* – this describes the overall operation capacity of the Project. 100% means all proposed available equipment and processes are active and operating at nominal expected performance levels. Note that during the greater sage-grouse breeding season, the studied timeframe of this noise analysis and over which the aforementioned ARMPA assessment criteria (see Section 2.3) apply, full operation capacity during all hours of the day and all seasons is likely to be a conservative evaluation assumption. The 80% operation level indicates that 20% of the available equipment and vehicles are offline; and 60% means 40% of the available equipment and vehicles are offline. Reduced operation capacity is assumed to apply to all Project areas under study.

- *Operation Distribution Percentage Applicable to Southern Areas* – these percentages describe how the equipment quantities assigned to QLC as shown in Table 1 are divided across the three distinct Project activity areas: Dawn, QLC North and QLC East. The reader can see that for each of the three Operation Levels, there are twelve studied scenarios that allow consideration of each of the southern Project activity areas having all (100%) or a majority (80%, 60% or 40%) of the assigned QLC equipment from Table 1.

- *Predicted Operations L_{50} (dBA) at Project:* – presented for both the Onset and Completion chronological milestones of Project progress as described in Section 3.1, these are the predicted A-weighted decibel values at the studied lek from the acoustical combination of all modeled Project equipment and activities from the King North Expansion and QLC areas.

- *Baseline L_{90} (dBA)* – this is the pre-Project outdoor ambient sound level that will be contrasted with the predicted Project operations L_{50} values to determine the difference (a.k.a., "delta") in dBA and thus assess whether or not the indicated scenario row in the matrix would cause an impact to greater sage-grouse at the studied lek.

- *Predicted dBA Difference at Project:* – presented for both the Onset and Completion chronological milestones of Project progress as described in Section 3.1, these values are the arithmetic differences between the predicted Project operations L_{50} values and the baseline L_{90} value.

Although the source level inputs are L_{eq} values, the predicted Project-attributed noise levels are expressed as L_{50} statistical values, on the basis of the following expression:

$$L_{eq}\ (\text{dBA}) = L_{50}\ (\text{dBA}) + 0.11*\sigma^2 = L_{50}\ (\text{dBA}) + 2\ (\text{dBA});\ \text{where}\ \sigma\ (\text{standard deviation}) \sim 4.3$$

The assumed standard deviation value above is interpolated between a 4.6 value indicated for outdoor nighttime sound and a 3.1 value for daytime outdoor sound (both from Table B-5 of the USEPA "Levels Document" [EPA, 1974]), since the time period being studied in this analysis (5:00 a.m. through 9:00 a.m.) is in the early morning hours usually associated with dawn.

Figures 12 through **15** display sample model scenarios of how predicted aggregate Project operations noise emission propagates across the Rossi Mine on-site and surrounding off-site areas. The colored shadings, modeled at one meter above grade, are superimposed upon a background of aerial imagery that shows the Rossi Mine and its surrounding geography.

Because the equipment quantities expected to be distributed and active at King North Dump Expansion are predicted to be constant for purposes of this analysis, they are not shown in Tables 2 and 3; however, their acoustical contribution to the aggregate operation sound attributed to the Project is included in the presented predicted Project operations levels. The elevations of these modeled King North Dump Expansion sound sources (as shown in **Figures 4** through **11**) do change and this influence is also reflected in the predicted levels shown in **Tables 2** and **3**.

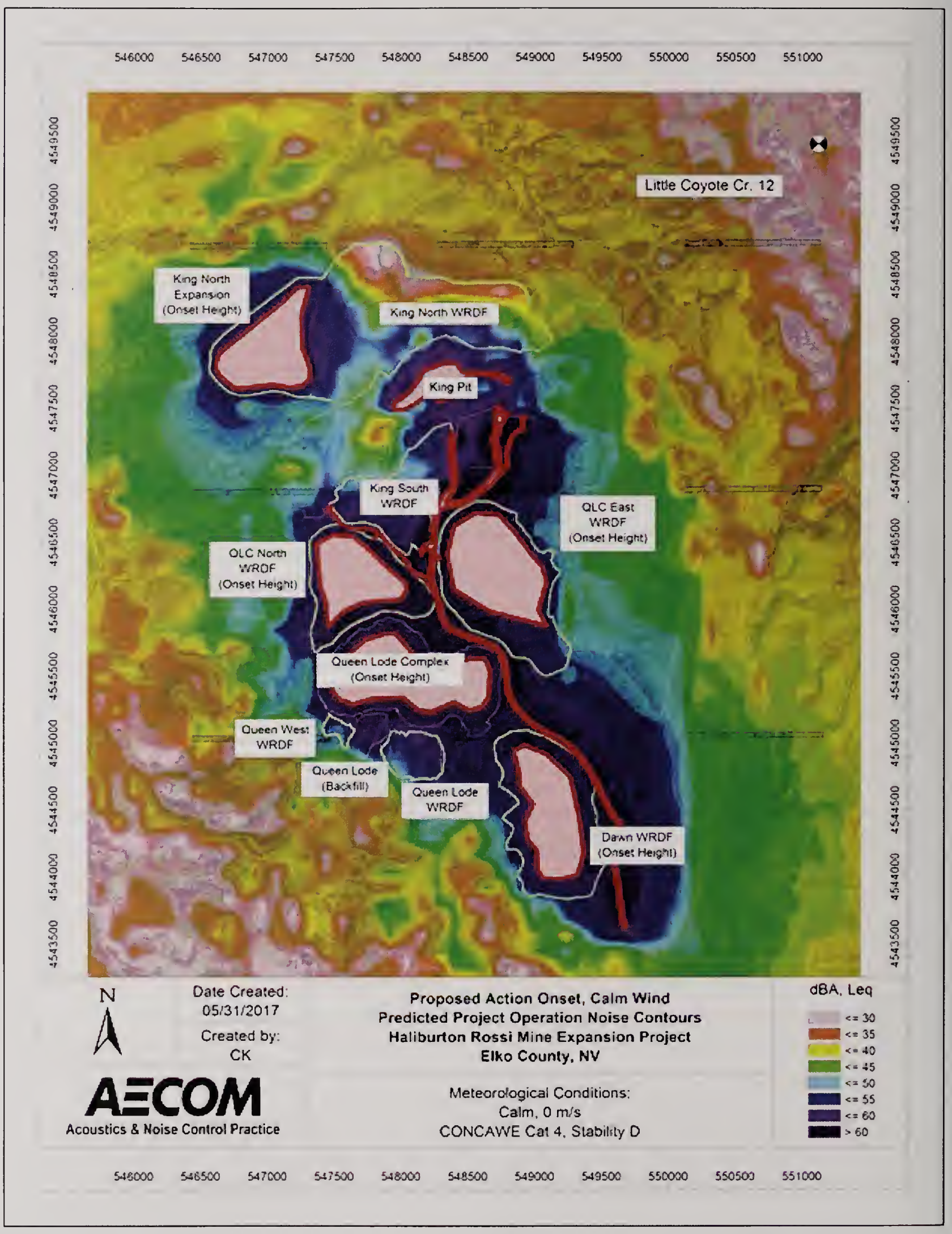


Figure 12 – Proposed Action, Project Onset case, calm conditions, full operation, with equipment and activities split evenly among the QLC area sources as appropriate

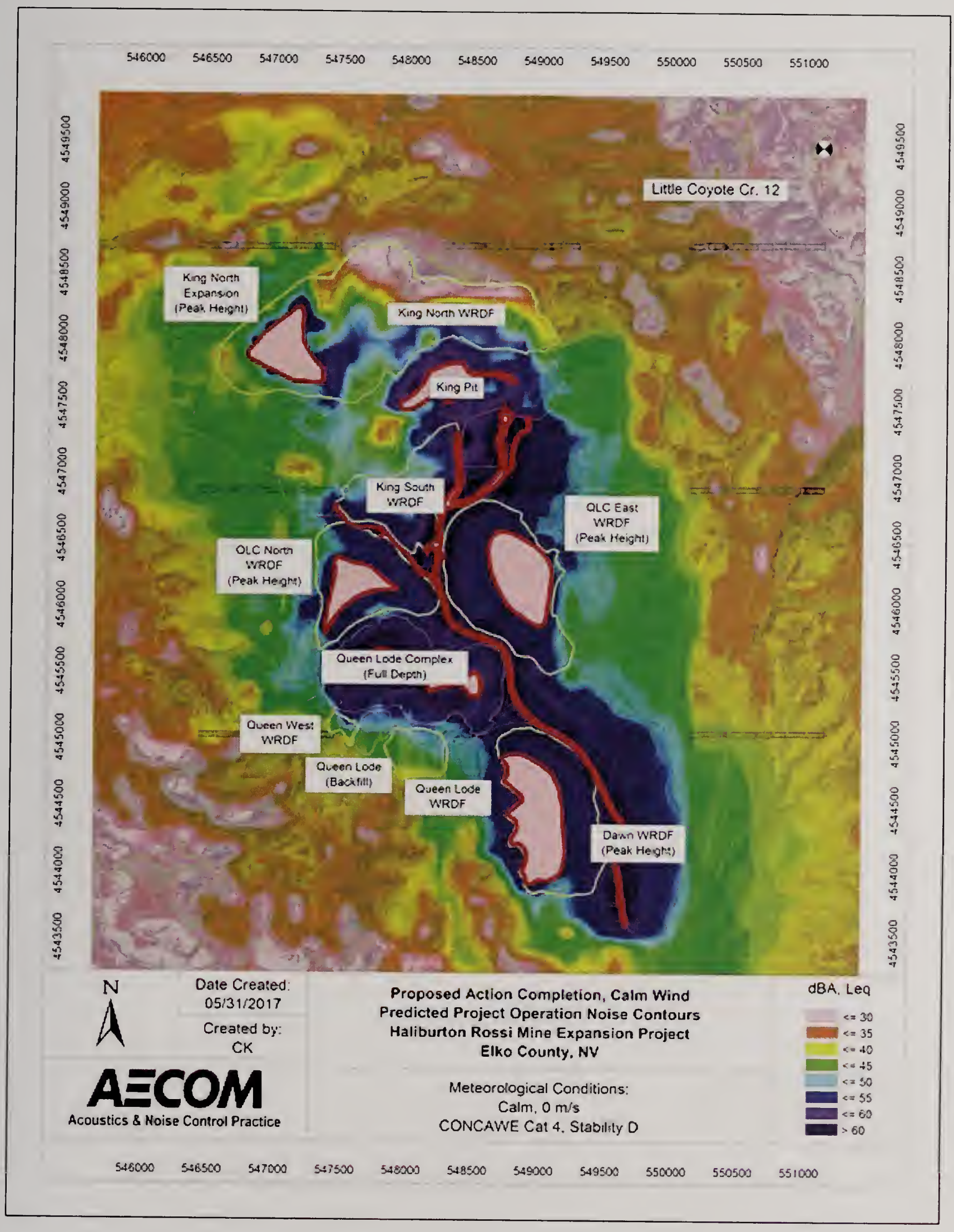


Figure 13 – Proposed Action, Project Completion case, calm conditions, full operation, with equipment and activities split evenly among the QLC area sources as appropriate

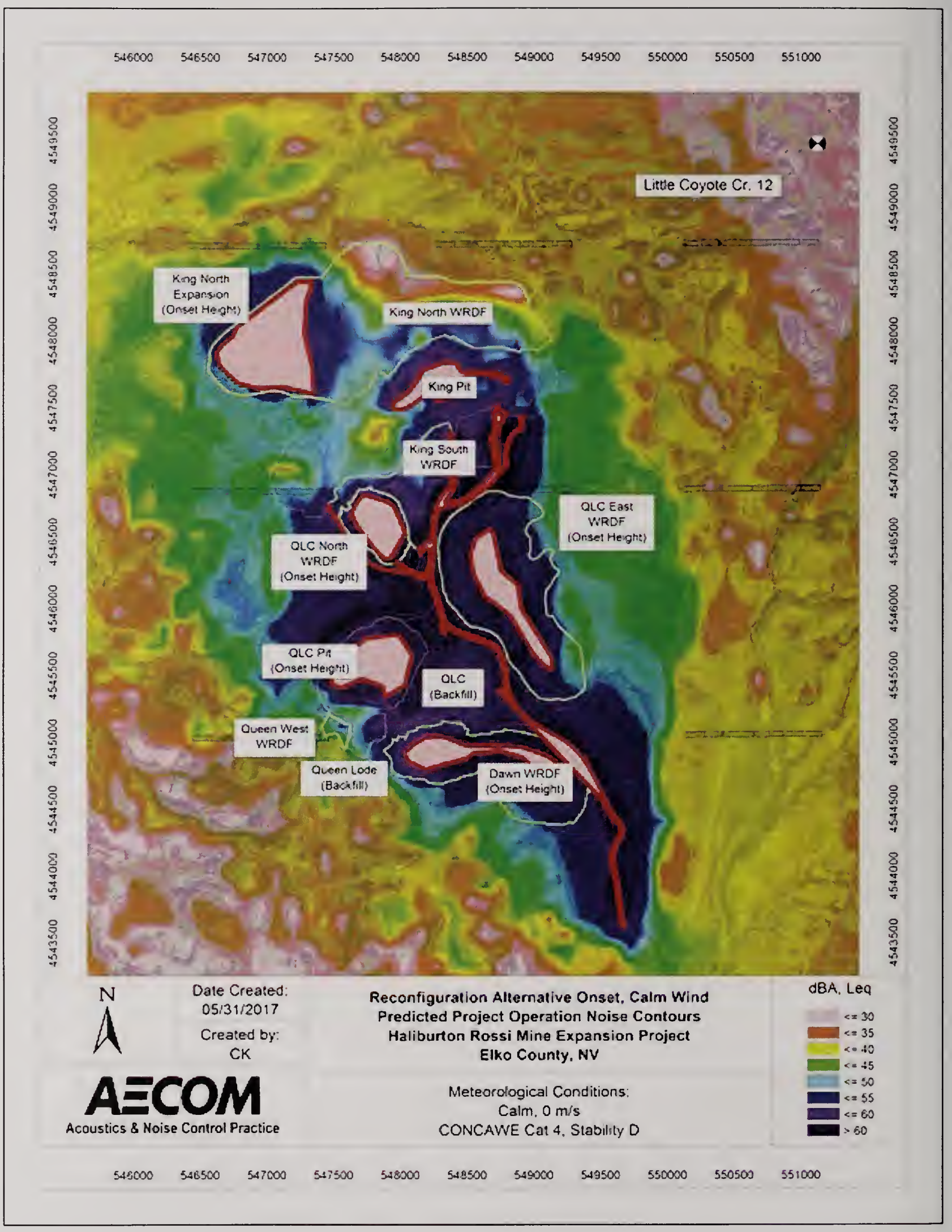


Figure 14 – Reconfiguration Alternative, Project Onset case, calm conditions, full operation, with equipment and activities split evenly among the QLC area sources as appropriate

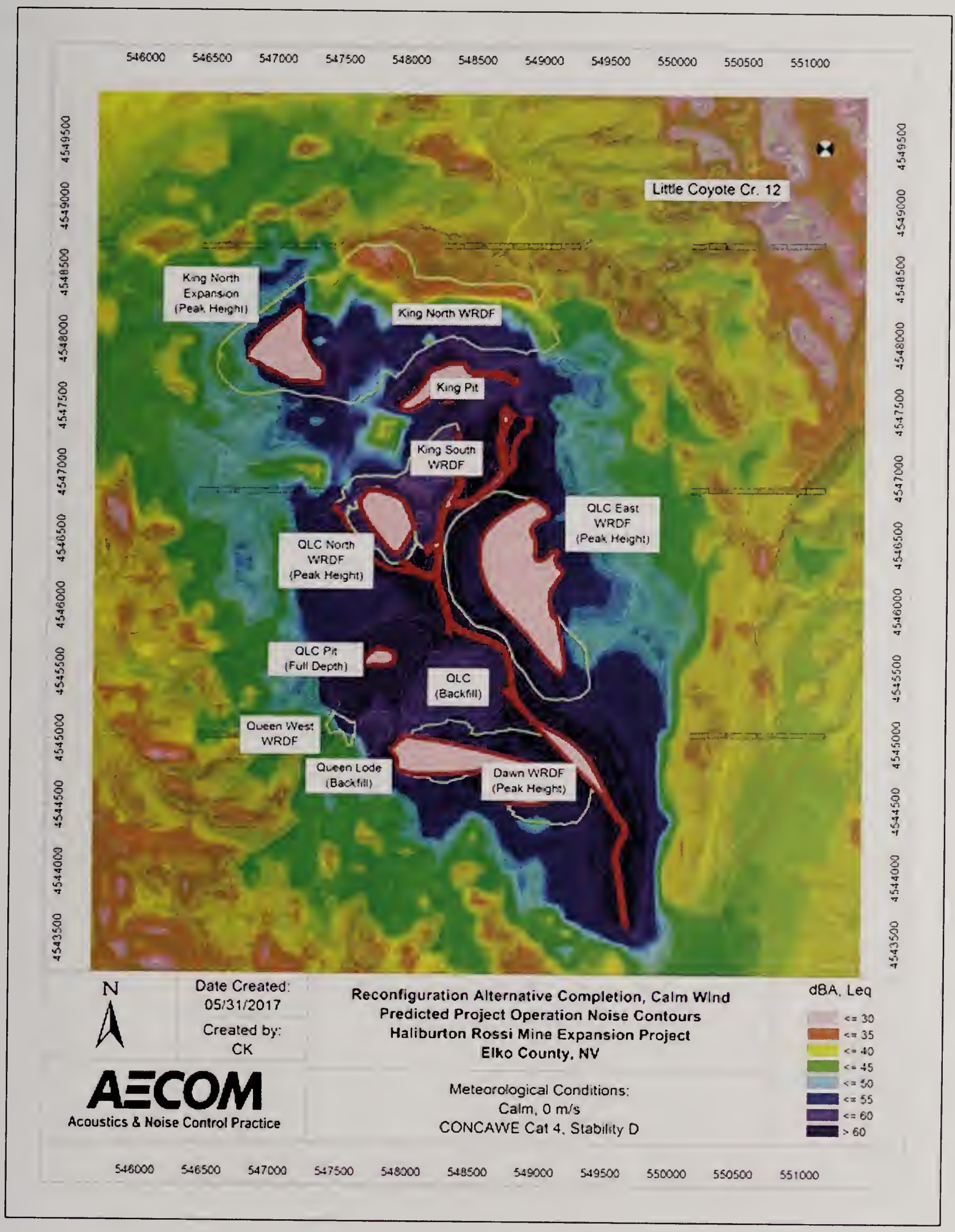


Figure 15 – Reconfiguration Alternative, Project Completion case, calm conditions, full operation, with equipment and activities split evenly among the QLC area sources as appropriate

Table 2. Estimated Proposed Action Project-attributed Operations Noise Received at Little Coyote Creek 12 Lek and Comparisons with Existing Ambient Sound Levels

	Operation Distribution Percentage Applicable to Southern Areas			Predicted Operations L_{50} (dBA) at Project:		Baseline L_{90} (dBA)	Predicted dBA Difference (Predicted Operations L_{50} - Baseline L_{90}) at Project:	
	Dawn	QLC North	QLC East	Onset	Completion		Onset	Completion
100% Operation Level	100	0	0	30.2	27.3	21	9.2	6.3
	80	10	10	30.3	27.5	21	9.3	6.5
	60	20	20	30.4	27.8	21	9.4	6.8
	40	30	30	30.5	28.0	21	9.5	7.0
	0	100	0	30.4	27.8	21	9.4	6.8
	10	80	10	30.5	27.9	21	9.5	6.9
	20	60	20	30.5	27.9	21	9.5	6.9
	30	40	30	30.5	28.0	21	9.5	7.0
	0	0	100	30.9	29.0	21	9.9	8.0
	10	10	80	30.7	28.7	21	9.7	7.7
	20	20	60	30.6	28.5	21	9.6	7.5
	30	30	40	30.5	28.2	21	9.5	7.2
80% Operation Level	100	0	0	29.6	27.0	21	8.6	6.0
	80	10	10	29.7	27.2	21	8.7	6.2
	60	20	20	29.8	27.5	21	8.8	6.5
	40	30	30	29.9	27.7	21	8.9	6.7
	0	100	0	29.8	27.4	21	8.8	6.4
	10	80	10	29.9	27.5	21	8.9	6.5
	20	60	20	29.9	27.5	21	8.9	6.5
	30	40	30	29.9	27.6	21	8.9	6.6
	0	0	100	30.2	28.5	21	9.2	7.5
	10	10	80	30.0	28.2	21	9.0	7.2
	20	20	60	29.9	28.0	21	8.9	7.0
	30	30	40	29.8	27.7	21	8.8	6.7
60% Operation Level	100	0	0	28.9	26.7	21	7.9	5.7
	80	10	10	29.0	26.9	21	8.0	5.9
	60	20	20	29.1	27.2	21	8.1	6.2
	40	30	30	29.2	27.4	21	8.2	6.4
	0	100	0	29.1	27.1	21	8.1	6.1
	10	80	10	29.2	27.2	21	8.2	6.2
	20	60	20	29.2	27.2	21	8.2	6.2
	30	40	30	29.2	27.3	21	8.2	6.3
	0	0	100	29.5	28.0	21	8.5	7.0
	10	10	80	29.3	27.7	21	8.3	6.7
	20	20	60	29.2	27.5	21	8.2	6.5
	30	30	40	29.1	27.2	21	8.1	6.2

Table 3. Estimated Reconfiguration Alternative Project-attributed Operations Noise Received at Little Coyote Creek 12 Lek and Comparisons with Existing Ambient Sound Levels

	Operation Distribution Percentage Applicable to Southern Areas			Predicted Operations L_{50} (dBA) at Project:		Baseline L_{90} (dBA)	Predicted dBA Difference (Predicted Operations L_{50} - Baseline L_{90}) at Project:	
	Dawn	QLC North	QLC East	Onset	Completion		Onset	Completion
100% Operation Level	100	0	0	29.7	27.0	21	8.7	6.0
	80	10	10	29.8	27.3	21	8.8	6.3
	60	20	20	30.0	27.6	21	9.0	6.6
	40	30	30	30.1	27.8	21	9.1	6.8
	0	100	0	30.0	27.7	21	9.0	6.7
	10	80	10	30.0	27.8	21	9.0	6.8
	20	60	20	30.1	27.8	21	9.1	6.8
	30	40	30	30.1	27.9	21	9.1	6.9
	0	0	100	30.5	28.8	21	9.5	7.8
	10	10	80	30.3	28.5	21	9.3	7.5
	20	20	60	30.2	28.3	21	9.2	7.3
	30	30	40	30.1	28.0	21	9.1	7.0
80% Operation Level	100	0	0	28.9	26.5	21	7.9	5.5
	80	10	10	29.0	26.8	21	8.0	5.8
	60	20	20	29.2	27.1	21	8.2	6.1
	40	30	30	29.3	27.3	21	8.3	6.3
	0	100	0	29.3	27.3	21	8.3	6.3
	10	80	10	29.3	27.4	21	8.3	6.4
	20	60	20	29.4	27.4	21	8.4	6.4
	30	40	30	29.4	27.5	21	8.4	6.5
	0	0	100	29.8	28.3	21	8.8	7.3
	10	10	80	29.6	28.0	21	8.6	7.0
	20	20	60	29.5	27.8	21	8.5	6.8
	30	30	40	29.4	27.5	21	8.4	6.5
Operation Level	100	0	0	28.0	25.9	21	7.0	4.9
	80	10	10	28.1	26.2	21	7.1	5.2
	60	20	20	28.3	26.5	21	7.3	5.5
	40	30	30	28.4	26.7	21	7.4	5.7
	0	100	0	28.6	26.9	21	7.6	5.9
	10	80	10	28.6	27.0	21	7.6	6.0
	20	60	20	28.7	27.0	21	7.7	6.0
	30	40	30	28.7	27.1	21	7.7	6.1
	0	0	100	29.0	27.7	21	8.0	6.7
	10	10	80	28.8	27.4	21	7.8	6.4
	20	20	60	28.7	27.2	21	7.7	6.2
	30	30	40	28.6	26.9	21	7.6	5.9

4. Adverse Effect Assessment

The two right-most columns in Tables 2 and 3 from the preceding section present dBA deltas (i.e., predicted Project operations L_{50} minus baseline L_{90}) that are all less than 10 dBA and, as a result, would suggest compliance with the applicable language of ARMPA for Nevada and BLM-adoption of the statistical value comparison between the predicted Project-attributed L_{50} value and the pre-Project baseline L_{90} value.

In summary, the following findings are evident from Tables 2 and 3:

- Operations noise during the Onset time period soon after Project commencement is predicted to be louder than that of the time period just before Project Completion.
- The "worst-case" scenarios involve 100% operation capacity with all (100%) of the southern-assigned Project equipment busy at the QLC East area.
- The Reconfiguration Alternative is predicted to be slightly quieter than the Proposed Action with respect to sound received at the active lek.
- Since all studied analysis scenarios predict deltas less than 10 dBA, there is no need for Project noise mitigation measures.

5. References

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6. Statement of Limitations

This draft technical report is for the sole use and benefit of Halliburton and the BLM and their authorized representatives. The scope of services performed in execution of this effort may not be appropriate to satisfy the needs of other users, and any use or reuse of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user. No expressed or implied representation or warranty is included or intended in this document except that the work was performed with the customary thoroughness and competence of professionals working in the same area on similar projects.

Background information on the Project has been furnished to AECOM by Halliburton and/or third parties, which AECOM has used in preparing this report. AECOM has relied on this information as furnished, and is neither responsible for nor has confirmed the accuracy of this information.

Portions of this report have been prepared based on certain key assumptions made by AECOM which substantially affect the conclusions and recommendations of this report. These assumptions, although thought to be reasonable and appropriate, may not prove to be true in the future. The conclusions and recommendations of AECOM are conditioned upon several assumptions. Noise levels found in this report include those predicted with CadnaA sound propagation modeling software, a commercially-available program not proprietary to AECOM.

7. Acronym List

The following is a list of acronyms and abbreviations used in this document.

dBA	A-weighted decibel
3-D	three dimensional
ARMPA	Approved Resource Management Plan Amendments
BLM	Bureau of Land Management
CONCAWE	Conservation of Clean Air and Water in Europe
dB	decibel
DEFRA	Department for Environment Food and Rural Affairs
DF	dump facility
EKO	Elko Regional Airport weather station
ELKO	Elko Regional Airport weather station
EPA	Environmental Protection Agency
Hz	Hertz (descriptor of acoustical frequency)
ISO	International Organization of Standardization
JCBA	J.C. Brennan & Associates
KEKO	Elko Regional Airport weather station
kHz	kilohertz
L_{50}	median sound level (level exceeded 50% of a given time period)
L_{90}	sound level exceeded 90% of a given time period
LCCL	Little Coyote Creek 12 Lek
L_{eq}	energy-equivalent sound level
L_{max}	maximum sound level
L_{min}	minimum sound level
L_n	percentile-exceeded statistical sound level
L_p	sound pressure level
L_w	sound power level
mps	meters per second
NDOW	Nevada Department of Wildlife
NMP	noise mitigation plan
OBCF	octave band center frequency
OHV	off-highway vehicle
Pa	Pascal (unit of pressure)
PDEIS	Preliminary Draft Environmental Impact Statement
PWL	sound power level
QLC	Queen Lode Complex
σ	sigma (standard deviation)
SPL	sound pressure level
WRDF	waste rock disposal facility